PUBLIC WORKS

May 1954

CITY, COUNTY AND STATE

Special Section on
PUBLIC HEALTH FACTORS IN WATER PLANT DESIGN, CONSTRUCTION AND OPERATION

New Water Filter Plant for Houston 87

Designs for Catch Basins and Inlets 106

Economics in Highway Relocation 108

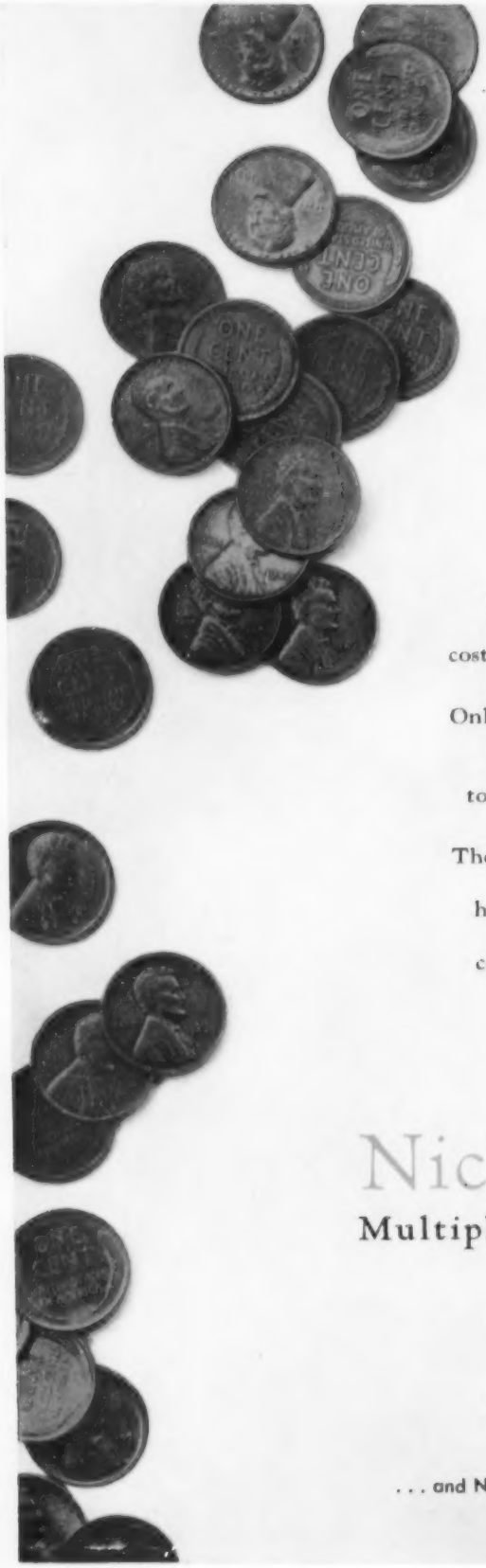
Treatment Plant Handles Ground Garbage .. 110

Oil Stabilization for Street Maintenance 115

Highway Signs for Problem Locations .. 121

Equipment for Water Works Operations . 124

D. B. Taylor, General Manager of the Baton Rouge Water Works Company, is well and favorably known wherever water works men meet. See page 23.



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The Catalytic Reduction Process* has been installed at the Columbus, Ohio Sewage Treatment Works. The Process has increased digester capacity. For treatment plant expansion in the near future, it will not be necessary to build additional digesters. The Catalytic Reduction Process applied to one 70′ tank at the Columbus plant increased total digester capacity by the equivalent of three tanks.

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Reprints of the paper by Professor P. F. Morgan on the development of this Process, and a paper by Mr. James H. Blodgett on the Columbus installation are available on request.

**The only proven Process for accelerating biological digestion. (Patents applied for.)*

The Catalytic Reduction Process is offered through the Catalytic Reduction Co., Inc. a subsidiary of the Chicago Pump Company.

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Dump today–diamond tomorrow

In the sanitary landfill method of refuse disposal, refuse is first spread as shown at this Lynchburg, Va., project.

Refuse is compacted, then covered with a two-foot layer of soil or other material.

Many communities have found the answer to their refuse disposal problem with sanitary landfills like this one. Using the rugged Cat* HT4 Shovel you see above, the city of Lynchburg, Virginia, is disposing of its refuse by using it as fill in the development of a four-acre athletic field for a local high school.

At the time these pictures were taken, 100 truckloads a day were being dumped here. The HT4 spreads and compacts the refuse, then covers it with a layer of earth.

What does the Public Service Department think of the HT4? John D. Roberson, Assistant Director, says, "We find this machine very economical to operate. It does a good job at low cost."

The Caterpillar HT4 Shovel is built to stay on the job longer and at lower cost than any competitive unit. Its big 80-inch bucket takes 1¼-yard bites. Girder-type frame is cross-braced for added strength at the hinge point. Box-section, all-welded lift arms are cross-braced to eliminate twisting. And it uses low-cost No. 2 furnace oil without fouling.

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PUBLIC WORKS MAGAZINE

CONTENTS

May, 1954 **Vol. 85, No. 5**

Plant of Unusual Design Treats Surface Water for Houston. *By Nat P. Turner* 87
Saving $150,000 a Year by Selling Waste Trees. *By E. J. Knudsen* 92
Public Health Factors in Water Plant Design, Construction and Operation. *By Dwight F. Metzler* 93
Modern Refuse Collection Pays Off. *By R. J. Snelbaugh* 105
Design for Catch Basins and Inlets for Storm Sewers 106
Economics in Highway Relocation. *By Guy B. Arthur* 108
Treatment Plant Takes Ground Garbage in Stride. *By C. W. Klassen, L. D. Hudson and R. G. Thomas* 110
Standby Power for Operation of Auxiliary Water Works Equipment. *By Melvin Williams* 113
Building a Combined Curb and Gutter. 114
Oil Stabilization for Street Maintenance. *By B. H. Cruce* 115
Land Trade Gave Us a New Public Works Garage. *By H. G. Kuhn* 117
How Los Angeles Handles Sewer Maintenance. 119
Special Sign Treatments for Problem Locations. *By H. R. Perkinson, Jr.* 121
Equipment Makes Better Water Department Operation. 124
Less Water = Better Roads. 141
Costs and Practices in Garbage Collection. 144
Concrete Saw Speeds Street Light Replacement. *By J. Leo Quigley* 146
How Manholes Are Checked for Toxic Gases. 149
Sanitary Engineering Research. 154
Trenching Crew Makes Four or Five Main Extensions Daily. 167
Treating Industrial Wastes. *By J. A. McCarthy and W. H. Oldaker* 170
Recommended Practice for Competitive Bidding and Letting. 180

PUBLIC WORKS DIGESTS

The Highway and Airport Digest 162
The Sewerage and Refuse Digest 174
The Water Works Digest 182

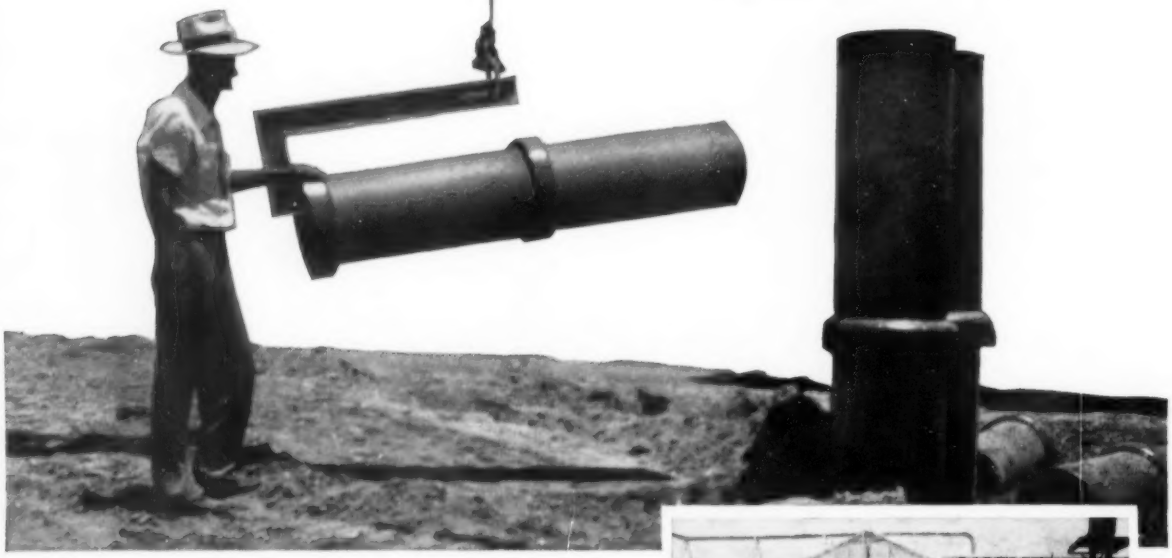
DEPARTMENTS AND SECTIONS

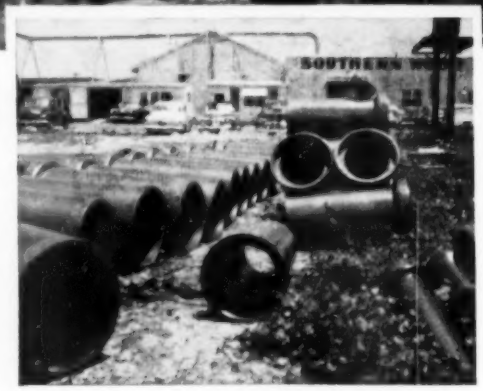
The Editor's Page 7
"Doc" Symons 14
"Jack" Ritter 18
Leaders in Public Works 22
Letters to the Editor 24
Books in Brief 26
The Engineers' Library 42
APWA News 127
Washington News 130
Public Works Engineering Data 138
Positions Wanted and Available 181
New Public Works Equipment 193
Worth Seeing 201
Worth Telling. *By A. K. Akers* 202

THE MOST USEFUL ENGINEERING MAGAZINE FOR CITIES, COUNTIES AND STATES

When Sewerage Projects are Bond-Financed...

Look for Vitrified CLAY PIPE





When a municipal sewerage project is financed by bonds that won't mature until 1993, the pipe has to be good. It *must* not fail—especially before the bond issue has been retired. That's why city officials and sewerage contractors all over the country confidently specify, buy, and install Vitrified Clay Pipe. They know Clay Pipe is the *only* pipe . . .

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The $27 million bond issue launched by the city of Miami will cover long-needed sewerage improvements that will require hundreds of thousands of feet of Vitrified Clay Pipe. In the 79th St. installation shown here—a small part of the overall project—some 12,000 feet of Clay Pipe were installed. City of Miami officials who directed various phases of this project are: Engineer Arthur E. Darlow, Inspector Frank Allen, and Supervisor of Sewer Design W. B. Lewis. Under the direction of General Contractor Joe Reinertson, Inc., were Design Engineer W. T. Eefting, Job Superintendent Tom Bryson, and Superintendent of Construction Inspection Fred Righter.

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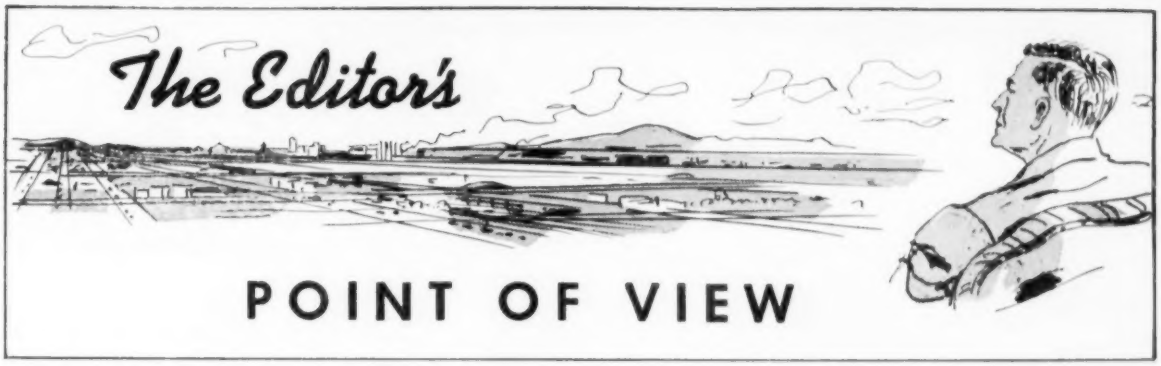

Water Supply and Waste Disposal in Our Ports and Harbors

DURING World War II, we shipped overseas more than eight million persons and much more than a hundred million tons of supplies. The conditions around and in our ports of embarkation illustrated vividly and most unpleasantly that we knew very little, if anything, about how to keep the quality of our port water supplies under control and how to dispose properly of the liquid and solid wastes resulting from the congestion in our ports. Nor did we know how to provide safe water on shipboard for all the people that were loaded into our ships. Fortunately, relatively few cases of disease resulted. Whether this was from plain good luck or because of the hasty and often heavy-handed measures adopted to meet the emergency is not and cannot be known.

This is a problem that needs research and study right now in these days of relative peace and quiet. If another war comes, we will again in all likelihood be shipping men and supplies overseas, and again in huge number and quantity. There will be no time then to develop methods, equipment and procedures. There is an opportunity for the board of health of every state in which there is a major port to undertake a study of this sort; or the Sanitary Engineering Committee of the National Research Council might well initiate a survey of the problem, clearing the field for a major and comprehensive determination of needs and establishing workable procedures.

When Motorists Have to Use Road Shoulders, It Is Time for More Roads

WHEN traffic delays get so bad that motorists, at the risk of arrest, start driving in considerable numbers on the road shoulders, it is time that someone did something about more and better highways. In the metropolitan area around New York, there have been a good many arrests lately for this cause. People, fed up with the intolerably crowded and inadequate roads, have demonstrated that they will take a chance of arrest or accident; and, unless all signs fail, this is a prelude to a higher accident toll.

Arrests are not the answer. Our roads ought to be able to carry the required traffic and our police ought to be better employed. In highways, this country is ten or fifteen years behind the times, in part because road moneys have been used for other purposes, good, bad and indifferent.

In the solution of this problem, we surely need some new engineering concepts and viewpoints.

Helping You to Get Your Mind Briefly Off Your Work

SOME years ago, when things were not quite as hectic as they sometimes get these days, we used to publish some "Timewasters," problems on which any good engineer could waste a couple of hours and which got him no place in the end. Looking back over some of these, it is shocking how many of them we can't solve any more. Just to see if the same condition affects our readers, here we go with a mild one: A number ends with the figure "2"; move the figure "2" from the end to the beginning of the number, and the new number is now just twice as great as the original number. What was the original number?

Too Many Figures Confuse the Issue

IT seems that every technical meeting we attend has one or more horrible examples of the futility of much of the lantern slide presentation of data. Masses of tabulated figures that cannot be seen, even by those on the front row seats, or digested even by the eggheads (to use a recent term for highbrows) seem to be the style and the habit—probably more the habit than anything else. Why not throw most of them away and reduce the rest to a simple graphical presentation, alike understandable and attractive? There is scarcely a month that we editors here at PW do not hack bodaciously at some of the immense and forbidding tables that our contributors sometimes put into their articles. We hope some time we can find an author who will give our readers simple directions for better presentation of tables, charts and similar data for papers at conventions. Anyone wanna contribute?

A reliable material

Installing 30-inch cast iron mechanical joint pipe for outfall sewer at East Providence, R. I.

Where installations are planned for long-term service to assure low cost per service year, engineers rely on cast iron pipe as a dependable and adaptable material. Consequently, it is specified for a wide variety of applications, both utility and industrial, including water supply, gas, sewerage, fire protection, power plants, oil refineries, process industries and many forms of special construction. Long life and low maintenance cost are *proved* results of the high beam-strength, compressive-strength, shock-strength and effective resistance to corrosion of cast iron pipe. For information write: Cast Iron Pipe Research Association, Thos. F. Wolfe, Managing Director, 122 So. Michigan Ave., Chicago 3, Ill.

(above)
Laying 16-inch cast iron pipe alongside railroad tracks at Ft. Lauderdale, Florida.

(at right)
Cast iron pipe being installed for large process industry plant in Chicago.

CAST IRON PIPE

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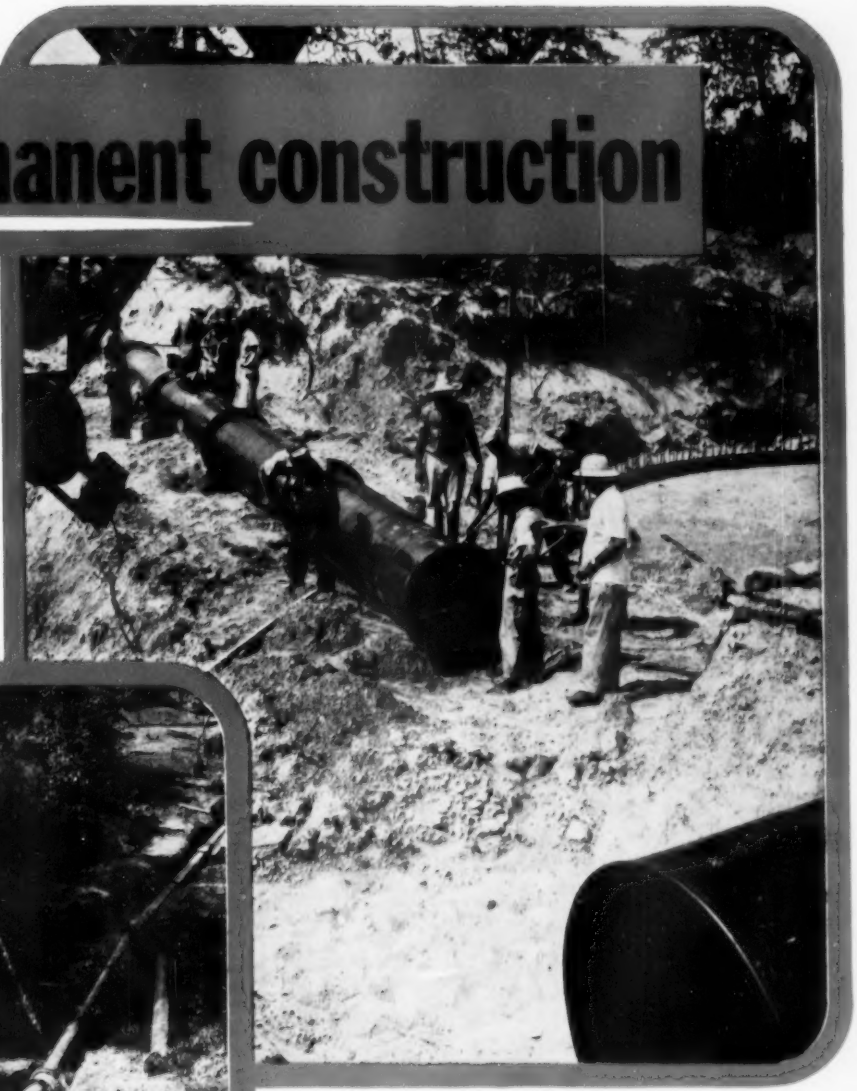

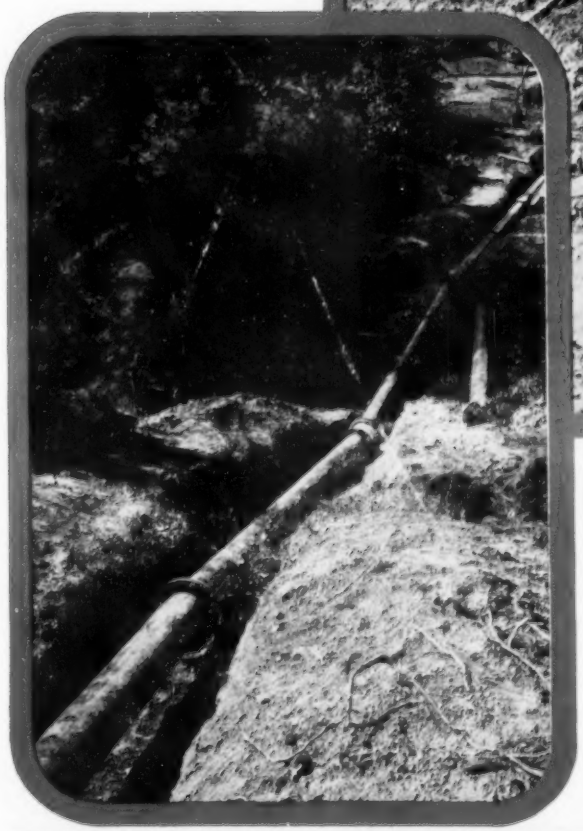

(above)
Installing 30-inch cast iron pipe for sewage treatment plant at Panama City, Florida.

(at left)
Eight-inch mechanical joint cast iron pipe installed under difficult conditions to carry coal mine water at Sumiton, Ala.

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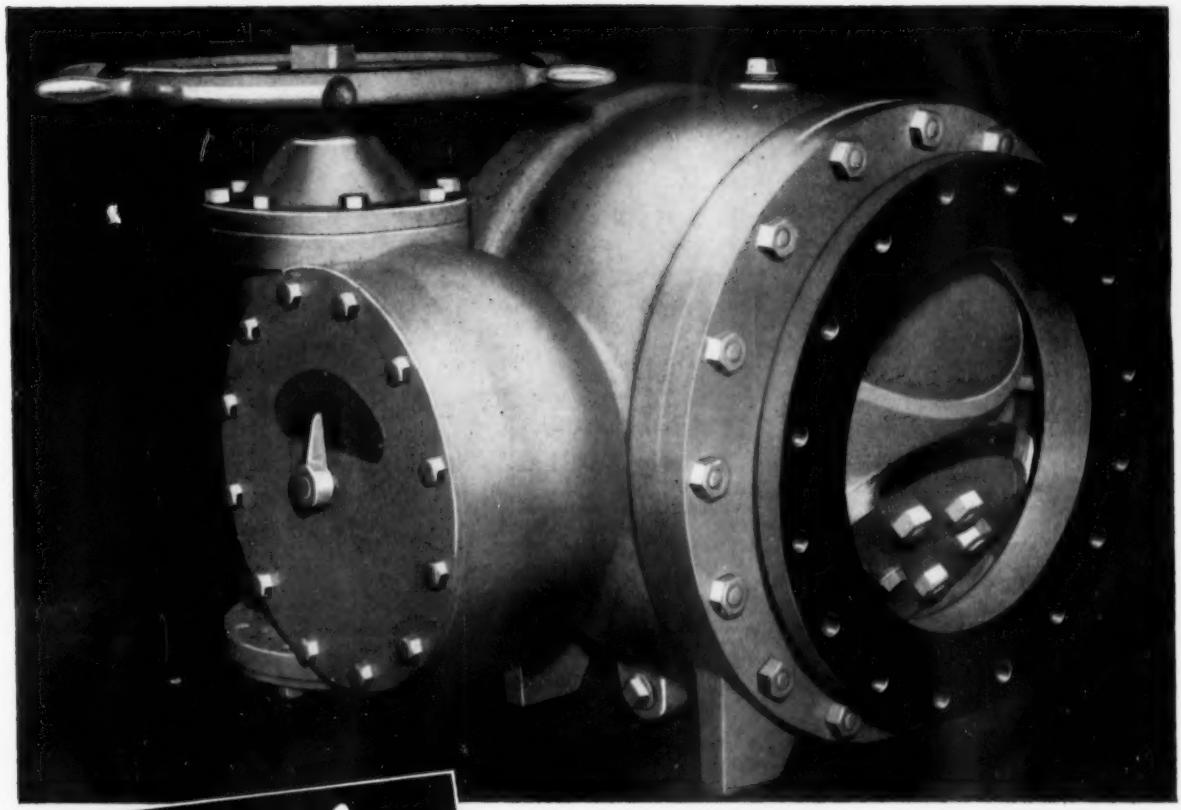

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THE S. MORGAN SMITH COMPANY introduces the

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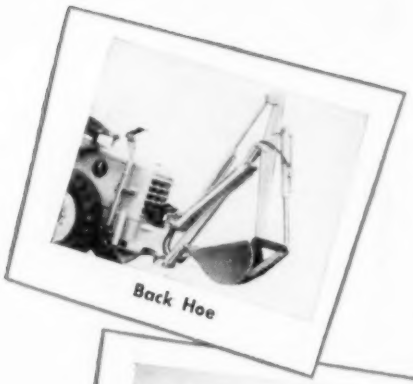
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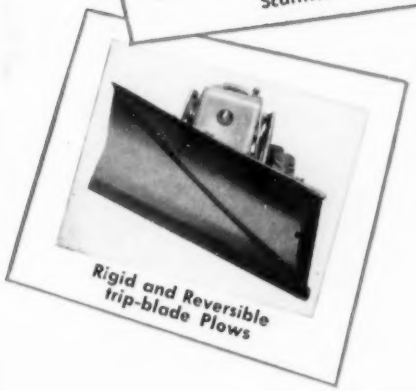
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People, Ideas and Events

BY "DOC" SYMONS

H.T.M.A. — And this is the month—the month of the AWWA annual convention in Seattle. Will you be there?

★ ★ ★

It's An Idea — W. F. Schaphorst, M.E., of Newark, N. J., is famous for his nomograms on how to measure plots of ground, sizes of piles, water rates, etc., etc., etc. Less known are some of his philosophies.

Several years ago I ran across this item from his collection—"When Andrew Carnegie was doing great things in a big way he declared that he could run his steel business more effectively while far-away in Scotland than when near by, in the United States. Nobody ever doubted Carnegie's word. The same is true of many of us, although our businesses are much smaller than Carnegie's. Trifling details with which we make daily contact become magnified and seem to be of much greater importance than they really are. We get into endless ruts from which we are unable to extricate ourselves. We travel in circles.—Carnegie did not bother with petty details. He was a real 'manager'".

But where does one find some one else to do these details for us, and what if we are the ones to whom some one else assigns the details? ? ?

★ ★ ★

Luminous Quote — "It costs more to Make History than the stuff is worth"—Jack Service in Sparling's Metrograms.

★ ★ ★

The 39th annual meeting of the NJSIWA, held in Atlantic City in March, drew a record.—Something new was added; a luncheon at which the ladies were invited. The annual "speechless dinner", however remains without benefit of the ladies—except performers. And speaking of performers, the last few years those shows have been great and quite a bit different from the days when the acts were "all high class stuff."—Remember? ? ?

Swedefinition — "Metallic Age—When we have gold in our teeth, silver in our hair, and lead in our pants."

★ ★ ★

I Read Somewhere — That "reclaimed rubber is not merely something to be used up to get rid of, but apparently adds certain chemical properties mixed with new rubber.—All the more reason why rubber reclaiming factories should keep these wastes out of municipal sewers.

★ ★ ★

Not too long ago, I saw an item in one of the chemical magazines, that sea water is made potable at the rate of 120,000 gal. per day in a triple effect evaporator of the Kuwait Oil Co. on the Persian Gulf. Probable cost, about $1.25 per 1000 gal.

The Saline Water Conservation Program of the U. S. Department of Interior is looking for a method to compete with present costs of municipal water treatment, which is somewhere in the neighborhood of 40 cents a thousand gallons, at a maximum.—They've still got a long way to go!

★ ★ ★

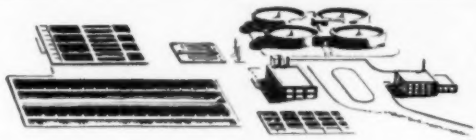
From the *Houghton Line*—"A pessimist has been defined as the man who finances an optimist."

★ ★ ★

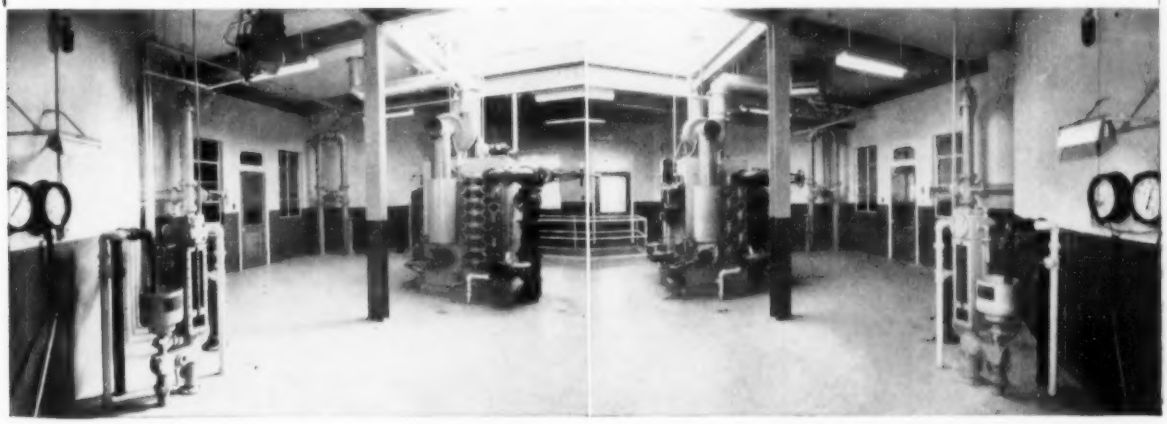
Everyone else has commented on the fact that Los Angeles made history in January, when it installed its 500,000th water meter since 1902, and who am I to be different.—What I noted in the picture was that Sam Morris, known as Sam I to many of us, hasn't aged a bit in the ten years since he was AWWA president. It must be the Los Angeles climate—can't be the smog—He looks as though he'll still be Gen. Mgr. of L. A. W & P Dept., when they put in the 1,000,000th meter.

(P. S.—How many of you know, who is Sam II? ? ?)

(*Continued on page* 186)



***At Levittown, Pennsylvania** a large city grows. According to Reader's Digest, this fastest-growing community in the world is destined to become one of the 50 major cities in the nation. Their modern sewage plant was designed by Albright & Friel, Inc. with Levitt & Sons' Sanitary Engineer, F. J. Biele.*



operability in a control room layout designed for

P.F.T. "CONTROLLED DIGESTION" SYSTEM

This modern control room is part of a well-designed sewage treatment plant rushed to completion in connection with the Fairless Plant of U.S. Steel. The plant was planned for flexible capacity and simple operation with P.F.T. "Controlled Digestion" equipment.

The control chamber is ideally housed . . . surrounded by the four 55-foot digesters. *P.F.T. Cover Position Indicator Dials* (with low-level alarms) flank each side of the room. An operator may see the exact position of the *P.F.T. Floating Covers* on his tanks at a glance. He may keep close control of supernatant liquor by means of the *P.F.T. Supernatant Selectors and Gauge Glass* located just below the indicators.

Ample space is provided in the control room for convenience in operation of the digester system.

The gas-fired *P.F.T. Heater and Heat Exchanger* (at left) has a capacity of 750,000 Btu per hour. The other unit (at right) is gas and oil fired with a 500,000 Btu per hour capacity. The entire plant incorporates the latest thinking in plant and control room design.

Modern safety features include these P.F.T. Gas Safety Units—two 3-inch waste gas burners; four 3-inch pressure relief units; four 3-inch low-pressure checks; four 3-inch sediment traps and accumulators; flame cells; manometers and drip taps. The gas safety equipment is located in a separate room. *Complete information on all or part of Levittown's equipment is yours upon request.*

Outside view of the four 55-foot digesters showing the convenient position of the control room.

Design of plant by / *Albright & Friel, Inc., Philadelphia, Pa.*

P.F.T.

waste treatment equipment exclusively since 1893

PACIFIC FLUSH TANK CO.

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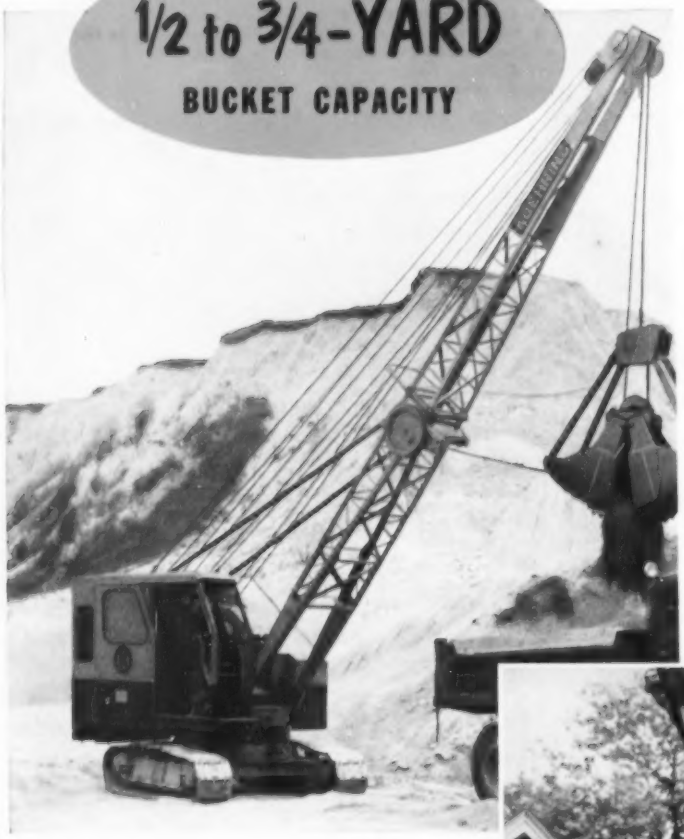
Now's the time to mail this month's Reader's Service card.

1/2 to 3/4-YARD
BUCKET CAPACITY



NEW Koehring 205 with 10 tons of lift capacity on crawlers (15 tons on rubber) has plenty of power, strength and stability to handle ½ to ¾-yard clamshell and dragline buckets on a wide work radius. Boom lengths range from 30 to 50 feet on the 205 crawler crane (25 to 55 feet on truck crane).

Crawler-mounted 205 with either standard or extra-long crawler frames, takes 16, 20 or 24-inch shoes . . . gives you ground-bearing pressure as low as 7.4 pounds per square inch. Crawlers are self-cleaning, have double-faced steel rollers, and high-carbon cast-steel shoes.

If mobility is needed the 205 is available on rubber . . . gives you the *plus* advantage of 15-ton lift capacity and 32½ m.p.h. travel speeds for clamshell, dragline and lift crane work. Converts to ½-yard shovel or hoe. Better look into this rugged new machine today.

With HEAVY-DUTY 205 you also get:

- **Full-rotating fairlead on dragline.**
- **Power boom lowering optional.**
- **Big 20-inch clutches, self-adjusting.**
- **Only 2 major shafts in upper machinery — simple, accessible.**
- **Antifriction power flow for dig, hoist, swing, and travel.**
- **4 hook rollers, eccentric adjustment.**
- **Automatic traction brakes.**
- **Independent traction, optional.**

PROVED *by 2 years of thorough field tests, Koehring 205 brings you this 10-to-15-ton capacity at only "½-yd." price. Get complete details from Koehring distributor, or write.*

To: KOEHRING COMPANY, Milwaukee 16, Wisconsin
Send us bulletin on the new heavy-duty 205.

NAME _____ TITLE _____
DIVISION _____
STREET _____
CITY _____ STATE _____

KOEHRING COMPANY
Subsidiaries: JOHNSON • KWIK-MIX • PARSONS

PW

Thousands use our Readers' Service card to keep up to date . . . do you?

The photos below illustrate typical concrete and asphalt removal practice now being employed by hundreds of Utilities, Municipalities, Contractors and Maintenance Crews in Streets, Floors and Sidewalks. The benefits include lower maintenance costs, lower installation, repair and replacement costs.

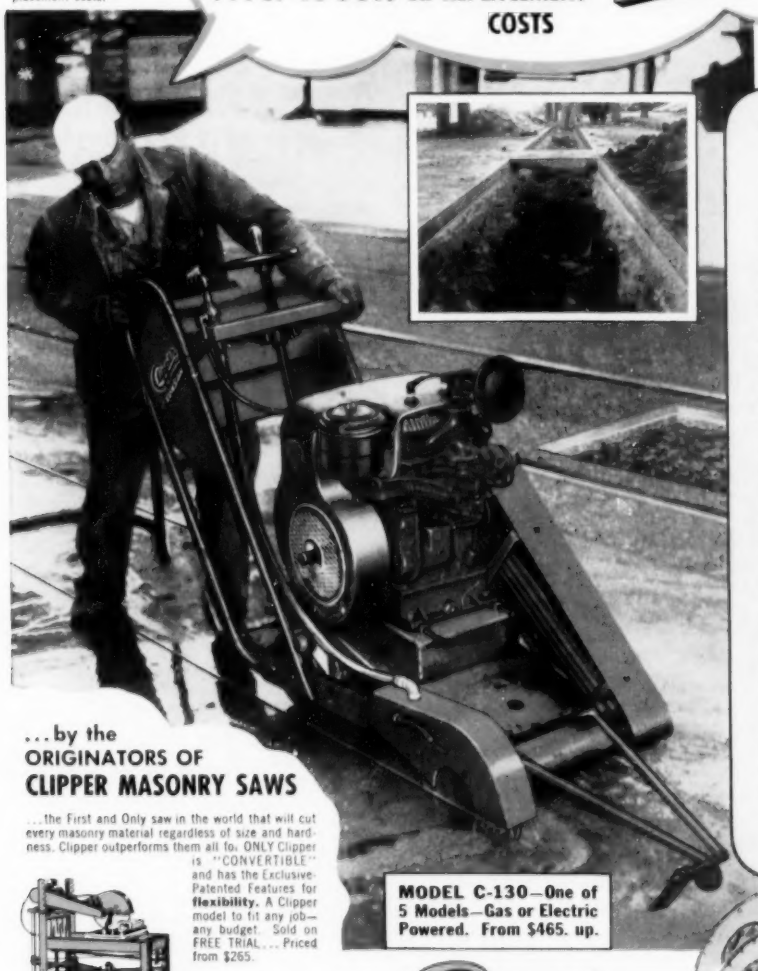
LOOK JOE! SAW CONCRETE & ASPHALT WITH A... Clipper CONSAW

"CUTS RIGHT THRU"

SAVES-

...UP TO 50% on REMOVAL TIME

... UP TO 50% on REPLACEMENT COSTS



...by the ORIGINATORS OF CLIPPER MASONRY SAWS

...the First and Only saw in the world that will cut every masonry material regardless of size and hardness. Clipper outperforms them all to. ONLY Clipper is "CONVERTIBLE" and has the Exclusive-Patented Features for **flexibility.** A Clipper model to fit any job—any budget. Sold on FREE TRIAL... Priced from $265.

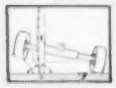
MODEL C-130—One of 5 Models—Gas or Electric Powered. From $465. up.

CUT COSTS by Sawing Contraction Joints—Trench and Patch Openings in Concrete & Asphalt

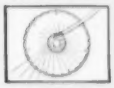
Save up to 50% in labor and material. Saw repair patches—water, gas, sewer and air line trenches in floors, streets, walks, highways. Save too, by sawing contraction joints in floors and highways...eliminate costly hand forming and spalling.

"4 OUT OF 5" BUY CLIPPER CONCRETE SAWS. Three-Point Suspension holds the blade straight and true in the cut—eliminates binding—twisting—drifting—sidewear and friction. The patented water application assures adequate coolant at all times—increased blade life and speed. Perfect balance and Dashboard Controls for operating ease and maneuverability.

Experience Proves a Concrete Saw Must Have These Clipper Features for MAXIMUM ECONOMY



3-POINT SUSPENSION



WATER SPRAY SYSTEM

INSTANTLY MANEUVERABLE

FREE TRIAL ON YOUR JOB!

This unqualified Clipper guarantee of satisfaction is backed by Nearly 20 Years of world-wide experience, the ability to select the finest materials and the "know-how" to put them together. ORDER TODAY...on FREE TRIAL. Discover for yourself how Clipper will increase your profits!

WORLD'S LARGEST MANUFACTURER OF MASONRY AND CONCRETE SAWS

***Quality is Consistent... Economy Certain with* CLIPPER SUPERIOR DIAMOND BLADES**

...guaranteed to..."Provide the fastest cut...at the lowest cost...with the greatest ease!" Clipper alone can supply every necessary metal bond... in over 36 specifications.

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SAME DAY SERVICE FROM YOUR NEAREST FACTORY BRANCH—

KANSAS CITY 8, MISSOURI

COAST TO COAST

- PHILADELPHIA
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COMPANY _____

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Need more facts about advertised products? Mail your Readers' Service card now.

"Pipe installation time and labor costs cut about 50% with Greenlee Pipe Pusher"

That's what a leading eastern utility reports as its experience with a GREENLEE Pipe Pusher on jobs as shown above. Let this remarkable tool make big timesavings and reduce job costs for you, too. With the GREENLEE Pusher, *one* man pushes pipe *under* streets, walks, floors, railways, lawns, etc. Eliminates extensive trenching and time-consuming tearing up, tunneling, backfilling, repaving. Often pays for itself on the first few jobs. Two models: No. 790 for pushing ¾" to 4" pipe; No. 795 for larger pipe and concrete ducts.

POWER PUMP for all models of GREENLEE Pipe Pushers. Makes the toughest pushing jobs simple, fast for *one man*. Average pushing performance: two feet per minute. Write today for complete details on timesaving GREENLEE Hydraulic Pipe Pushers.

GREENLEE

GREENLEE TOOL CO., Division of **GREENLEE BROS. & CO.**
2045 Columbia Ave., Rockford, Illinois

UP FRONT FOR ADEQUATE ROADS

LEO J. RITTER, JR.
New York University

Gadgeteering (Large Scale): The New Jersey Highway Department is giving an "anti-skid" treatment to a number of existing steel grid bridge decks by the use of a special machine manufactured by the Reliance Steel Co., McKeesport, Pa. The machine cuts hundreds of notches in the steel grids; the notches are 3/8 inch wide and 3/16 inch deep. A nine-wheel, self-propelled, pneumatic-tire roller—the first of its kind—has been placed on the market by the Tampo Manufacturing Company of San Antonio, Texas. The roller has maximum loading of 250 pounds per lineal inch of roller width, and working speeds of 2 1/2 and 4 1/2 miles per hour. A fog-dispelling machine with an 11 1/2-foot wooden propeller has been placed in operation by the Department of Highways in Pennsylvania. A new giant walking dragline, used in the surface mining of coal, has a 35 cubic yard bucket and a boom 220 feet long; one "bite" takes a load of dirt as big as a bedroom in an ordinary house.

This and That: Rubber guard posts have replaced steel posts at a dangerous intersection in Cuyahoga Falls, Ohio. Each post consists of a five-foot rubber tube which slips down over a short steel tube embedded in concrete. The Nu-Bone Company of Erie, Pa. is now marketing a rustproof sign panel of a reinforced fiber-glass material—trade name is "Durasign"—coloring is permanent and it is lighter in weight than some other materials. The Department of Traffic of the City of New York has ordered 3500 new red stop signs, having adopted this type as standard for new installations. The Bureau of Public Roads has reported that highway construction costs hit a two-year low during the fourth quarter of 1953—the composite mile index for the period was 156.9 (Index = 100 for average costs during 1925-29.)

Out-of-Season: Something you may want to add to your library before next fall is "Recommended Practice for Snow Removal and Treatment of Icy Pavements", which is Current Road Problems No. 9-3R, published by the Highway Research Board, 2101 Constitution Avenue, Washington, D. C. Prepared by the Committee on Snow and Ice Control, this small bulletin is the latest word on the subject.

Golden Rule: A nationwide traffic-safety campaign now underway is based on the slogan "Make courtesy your code of the road." Aimed particularly at the improvement of driver attitudes, which are the basic cause of many accidents, the drive is sponsored by the Inter-Industry Highway Safety Committee, the National Committee for Traffic Safety, and the National Safety Council. The code of the road asks the motorist to do the following things:

(1) Share the road by driving in the proper lane,
(2) Allow ample clearance when passing,
(3) Yield the right of way to other drivers and pedestrians,
(4) Give proper signals for turns and stops,
(5) Dim headlights when meeting or following vehicles,
(6) Respect traffic laws, signs, signals, and road markings, and
(7) Adjust driving to road, traffic, and weather conditions.

Man, wouldn't life on the road be easier if *all* of us did all of these things? I don't see how anyone who scrupulously follows these rules would ever be involved in a serious accident.

Money, Money, Money: Expenditures and finance remain the main issues of the day in highways in this country. Recent items include the following: A. E. Johnson, current president of the American Association of State Highway Officials, recently testified before a congres-

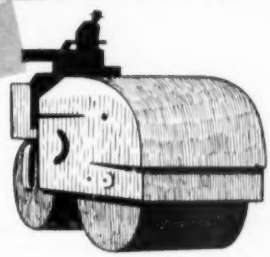
(*Continued on page* 172)

NATION NEEDS MORE ROADS!

TRAFFIC LOADS, SPEEDS BEING STEPPED UP!

GRAVEL SUPPLY SHORT IN MANY AREAS!

COSTS GOING UP!



Yes, the **PRESSURE** is on . . . **YOU!**

PLAN NOW . . . Better Stabilization . . . of Bases, Surface Shoulders . . . for a Total Cost of 5¢* per Square Yard with

STERLING ROCK SALT

"NATURE'S OWN SOIL STABILIZER"

STERLING ROCK SALT keeps your road mix "alive" . . . able to adapt itself and compensate quickly for excessive moisture or dryness, and sudden temperature changes. Water swells clay. But, in heavy rains, salt changes to brine, preserving the bond. In dry spells, salt crystallizes at the surface, preventing the clay binder from drying up.

Rock salt is soil's "thermostat" — the *natural* ingredient that keeps aggregates, fines and clay together in year-round permanence. Order your spring needs NOW or, for more information, send coupon.

**Actual cost-check from Hancock County, Ill.—$.0464*

INTERNATIONAL SALT COMPANY, INC.
INDUSTRIAL DIVISION, SCRANTON, PENNSYLVANIA

Get FREE Bulletins . . . "Better Highways Through Salt-Soil Stabilization"

Application methods and operational procedures . . . plant and road mixing . . . storage and handling hints . . . a wealth of helpful, practical on-the-job information.

IMPORTANT COUPON—MAIL TODAY

INDUSTRIAL DIVISION, DEPT. PW-5,
INTERNATIONAL SALT COMPANY, INC., SCRANTON 2, PA.

☐ Please have representative call. ☐ Send complete file of "Better Highways" bulletins.

Name _____

Company _____

Address _____

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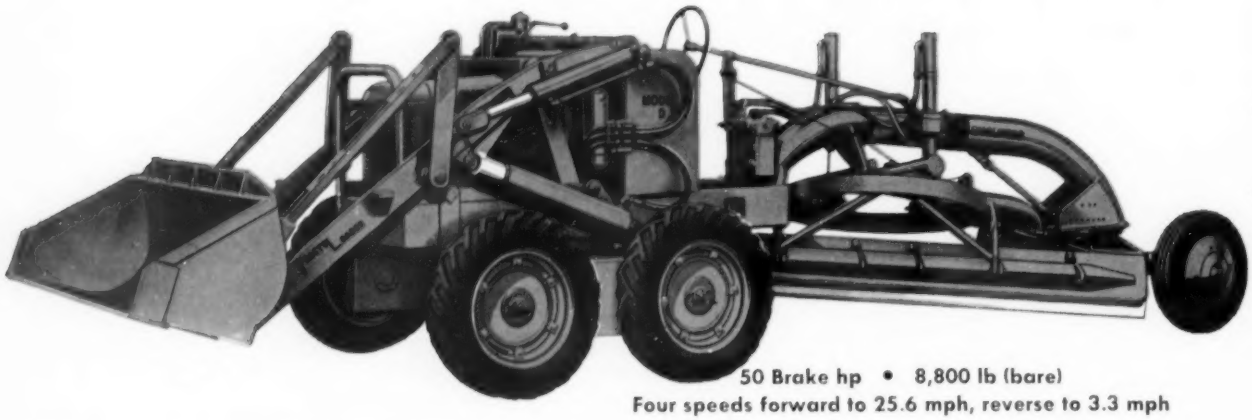
Get full details of this month's products . . . mail your Readers' Service card today.

Dozens of Uses • Thousands of Users
Prove Ability, Versatility of the Model D



50 Brake hp • 8,800 lb (bare)
Four speeds forward to 25.6 mph, reverse to 3.3 mph

The thousands of satisfied owners are still finding new uses for the able and versatile Allis-Chalmers Model D Grader. It has proved again and again that it has the power and capacity to do outstanding work on both construction and maintenance.

Usefulness of the Model D is multiplied by several easily mounted attachments: hydraulically controlled rear-end loader, shoulder maintainer that is interchangeable with the loader, scarifier, both V-type and blade snowplows.

MORE POWER, NEW FEATURES, LOW COST

For even greater performance ability, power for the Model D has been boosted to 50 brake hp. Also, leaning front wheels and power circle turn now are available (optional). With these and other big-grader features such as tandem drive, ROLL-AWAY Moldboard, tubular frame and hydraulic blade lift — the Model D's original cost still is but one-third that of a large grader. Operating costs are low, too.

Your Allis-Chalmers dealer will be glad to demonstrate what the versatile, economical Model D can do for you.

ROLL-AWAY is an Allis-Chalmers trademark.

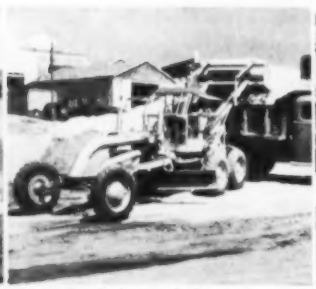
ALLIS-CHALMERS
TRACTOR DIVISION — MILWAUKEE 1, U. S. A.

...for contractors

Finish grades between forms on road and street construction.

Levels for home building, parking lots, play areas, etc.

Terraces, builds diversion ditches, does miscellaneous grader work.



Loads sand, gravel, dirt, any material, with ⅝-yd. bucket.

Rough grades, spreads and cleans up on street or road construction.

Landscapes, grades lawns, slopes, ditches around housing projects.

Now's the time to mail this month's Readers' Service card.

...for county and state highway departments

Scarifies with plenty of down pressure, accurate hydraulic control.

Mixes thoroughly, with rolling action of ROLL-AWAY moldboard.

Cuts and cleans ditches, slopes banks, grades shoulders.

Reshapes and maintains shoulders with rear-mounted attachment.

Loads sand, dirt, snow—any material — to trucks.

Keeps roads in shape the year-round — clears snow in winter.

...for cities towns and townships

Maintains streets and alleys, park drives, playgrounds.

Handles light construction on streets, roadways, etc.

Backfills ditches, packs and levels ground, loads excess dirt to trucks.

Removes weeds from street sides and alleys, loads or hauls away.

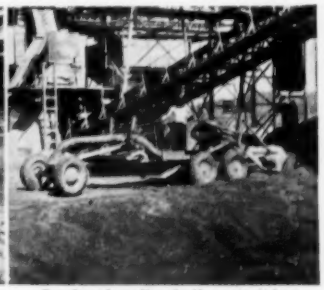
Windrows snow with blade, or plows with V or blade plow.

Loads snow from gutters, maintains stockpiles, handles bulk materials.

...and others

Builds and maintains access roads for quarries, cemeteries, etc.

Clears and loads snow at quarries, storage yards, parking areas.



Grades, handles bulk materials around industrial plants.

Thousands use our Readers' Service card to keep up to date . . . do you?

Maintained Accuracy... over wide capacity range
Accuracy not affected by pulsations, pressures or other variables
Compact design... to save space and foundation costs
Long-time reliability with little maintenance

CHECK THE "BIG 4"

ESSENTIALS FOR METER PERFORMANCE

The basic accuracy of Roots-Connersville Positive Displacement Meters stems from their simple design, with no valves, vanes or other small parts. And, because there is nothing to wear out, this accuracy is maintained for many years—with little maintenance or other supervision.

Where space is a factor, the compactness of R-C units is important. Capacity of 1,000,000 cfh, for instance, requires only 98 feet of floor area. Small meters can be tucked away in otherwise unusable space. Short-time overloads up to 50% of capacity can be handled without loss of accuracy.

These outstanding values in R-C Meters come from a century of building equipment to handle gas or air, and have been long proved in large and small installations for industry and public utilities.

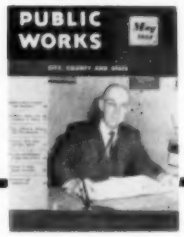
For detailed information, ask for Bulletin M-152, which also contains a handy selection table to simplify selection of size and type required.

ROOTS-CONNERSVILLE BLOWER

Reg. U.S. Pat. Off.

A DIVISION OF DRESSER INDUSTRIES, INC.
554 Poplar Ave. · Connersville, Indiana

Specialists in handling gas and air



LEADERS IN PUBLIC WORKS

D. R. Taylor has been general manager of the Baton Rouge Water Works Company, Baton Rouge, Louisiana, since 1947. A graduate of Virginia Tech, with a B.S. in M.E. degree, he was assistant city manager at Roanoke, Virginia, prior to coming to Baton Rouge. He was superintendent of the Roanoke Water Department for twenty-two years except for thirty-seven months during World War II when he was Major, CE, and Chief of Water, Sewerage and Waste Disposal, Fourth Service Command, Atlanta, supervising those utility operations at all military installations in the seven southeastern states.

Since his coming to Baton Rouge, the area of the City has been increased 550 percent by annexation in 1949, the population 167 percent and the water consumers from 23,074 to 41,600. During a construction program scheduled to be completed this year, one hundred miles of mains and 1063 fire hydrants have been installed.

His contributions in the water works field include many papers and articles. He served as chairman of the Virginia Section, A.W.W.A. in 1936 and received the George W. Fuller Award from that Section in 1942 for outstanding contributions to the water works profession. He is a member of various civic, engineering and professional societies, including the A.S.C.E., A.W.W.A., F.I.S.W.A., I.C.M.A., and Louisiana Engineering Society. He is a registered professional engineer and is married. His hobbies, besides utility administration and engineering, are flower and shrubbery culture, kodachrome photography and golf.

Need more facts about advertised products? Mail your Readers' Service card now.

Graver plays no favorites . . . we can supply both the Reactivator®, a self-contained high-rate unit of the solids-contact type; and the conventional equipment for coagulation and sedimentation. Also, for water softening and clarification in medium and smaller size municipalities, Graver can furnish a package water treatment plant using the Reactivator® . . . complete from inlet to outlet.

Write for bulletin WC-113 dealing exclusively with municipal water conditioning equipment.

Graver Water Conditioning Co. *A Division of Graver Tank & Mfg. Co., Inc.*
216 West 14th Street, New York 11, N. Y.

It's a fact . . . our handy Readers' Service card is the way to get new catalogs.

MAKE IT BUDGE

WITH A MAN-SIZED *Nudge*

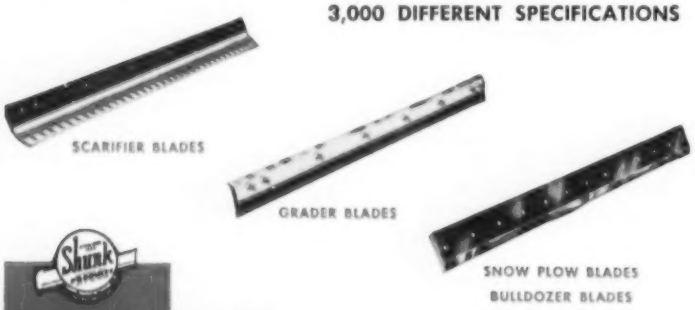
Whether you're trying to budge heavy dirt in Illinois, snow in New England or shale in the Carolinas, you can depend on SHUNK blades.

They're rolled from top-quality steel to our own specifications; economical; designed to take heavy punishment.

For almost a century the name SHUNK has been a byword in all parts of the world to everyone concerned with maintenance and construction blades . . . original equipment manufacturers, contractors, distributors. Let us show you why . . . specify a SHUNK blade for *your* job.

Literature on request.

3,000 DIFFERENT SPECIFICATIONS



Shunk MANUFACTURING COMPANY

In Our 99th Year

BEST BLADES MADE

BUCYRUS, OHIO

Get full details of this month's products . . . mail your Readers' Service card today.

A WORD FROM DOWN UNDER

We are very interested in the three articles on Soil Engineering by Leo J. Ritter, Jr., which have been published in Public Works. Our City Engineer, A. J. Dickson, BE, MICE, has a very high opinion of the worth of these articles and he has made them compulsory reading for all members of his staff. It is stated that these three articles will be reprinted separately and I would like to know if copies are available yet.

Marjorie Warwick,
Municipal Reference Library,
Auckland, New Zealand

Ed. Note: The articles have been reprinted and are available at this time.

WINTER TIME IS COMING

Your little ticket in one of the recent issues asking for ideas reminds me I have one I would like to pass along. The only time it is good, however, is the last part of December when we all fix over our calendars for next year. All I would like to know is when you receive articles for the issue that goes out about January 1st.

Yours is about the only magazine I enjoy reading, because it applies more to the type and size and kind of work we do. Keep it up!

J. L. Morris,
City Engineer.
Boise, Idaho

LANES FOR UPHILL ROADS

The article "Extra Lanes for Uphill Roads for Better Health" in your editorial of the March, 1954, issue of Public Works is more important than the space allotted to it seems to indicate. The idea could be expanded to include long stretches of comparatively straight stretches of highway as well as the narrow and crooked variety.

You can't beat a Johnston Dealer for pump know-how...

Look at this water works installation for example

When the Jamaica Water Supply Company of Long Island, New York, decided to spend nearly $4,000,000 to expand their facilities, they took a long, hard look at different makes of pumps . . . AND JOHNSTON PUMPS WERE SELECTED FOR THE FIRST TWO OF 67 WELLS TO BE DRILLED.

One of these is pictured above. It is a 125 horsepower unit, designed to deliver 1600 gallons per minute against a 260 foot head. On pumping jobs like this one, DEPENDABILITY is a *must*. Shut-downs are costly to the water company and can cause a lot of trouble for water users. Designing such a water plant requires a lot of engineering experience and pump know-how. Working with water company engineers, C. W. Lauman and Company, Johnston's Dealer, provided many answers to the pumping problems.

This is typical of the help and know-how you get from Johnston Dealers.

For complete information about Johnston Pumps mail the coupon today.

JOHNSTON VERTICAL PUMPS

Johnston Pump Company
Bin "K", Pasadena 15, California

☐ Please send your bulletin J-54

☐ Have your representative call.

NAME _____

ADDRESS _____

CITY _____ ZONE _____ STATE _____

Now's the time to mail this month's Readers' Service card.

Get Into Tight Spots at a Profit . . . With a Sherman Power Digger!

Here's real proof of the compactness and maneuverability of the Sherman Power Digger! The job: Dig a 6 foot deep machine foundation hole 10 feet square in a working area only 20 feet square, with overhead beams and lights reducing the ceiling limit to less than 10 feet in some spots.

The floor was 8 to 10 inches of concrete, reinforced with ¼ inch steel rod. It was broken up with air tools, then loaded into a dump truck by the digger. Manual loading would have been difficult because of the reinforcing rods, but these presented no problem when loaded mechanically.

Digging and loading took less than four hours, in spite of the limited maneuvering area. Estimated time for hand labor: Three men working about 2½ days!

If you now excavate by hand, or if your heavier power equipment cannot work in tight spots, you'll profit with a Sherman Power Digger. It's compact, flexible, fast, easy to operate. It costs little to buy, less to maintain, quickly pays for itself. For the whole story, write today for Bulletin No. 5 'N.

Designed, Engineered and Manufactured Jointly by
SHERMAN PRODUCTS, Inc.
Royal Oak, Michigan
WAIN-ROY CORPORATION
Hubbardston, Mass.

Patent No. 2,303,852
Other patents pending
© SHERMAN PRODUCTS INC., 1954

Sherman
PRODUCTS, INC.
ROYAL OAK, MICHIGAN

Thousands use our Readers' Service card to keep up to date . . . do you?

Between Kokomo and Indianapolis, there is a 31-mile stretch of highway with not a single horizontal bobble and not a single town of any sort along it. Approximately 2½ miles of this is duel lane.

I have driven to and from Florida several times and am acquainted with the third lanes you mentioned in your editorial. These turnouts are appreciated especially by those who are in a hurry to cover as much distance as possible in a limited period of time.

Many times I have been trapped behind slowly moving vehicles in all three cases mentioned herein. Why not advocate turnouts or compulsory stops for the creeping monsters when they travel the narrow and crooked roads? Why wouldn't a minimum speed be advisable in some cases? Trucks are not the only offenders. It seems to me that many picknickers insist on using busy highways for their playground.

Perhaps I am all wet in my thinking but I am used to being in the minority.

Lotus A. Warden,
City Engineer,
Kokomo, Ind.

FEBRUARY CORRECTION

In the February issue of Public Works, there appeared an article by H. B. Wilson, C.E. on "Low Cost City Pavements in Detroit." Under "Table 1—Asphalt Cement Characteristics" under Bitumen (a) organic matter (insoluble) not less than 0.5%. This should read not *more* than 0.5%.

Jan Schmedding,
Sup't. Street Constr. & Mtce.,
Detroit, Mich.

BOOKS IN BRIEF

ENGINEERING FOR AGRICULTURAL DRAINAGE

Though this book is intended especially for those interested in agricultural drainage, it has a great deal of material in it for the municipal and consulting engineer. The discussion of soils in relation to drainage and the water properties of soils is excellent. So is the chapter on rainfall and runoff, which is 45 pages in length and contains much precise information. Other factors that the engineer will find of value include: Design of open ditches; open ditch construction and maintenance; drain and under-

ONE Truck and Only ONE Man Handle 15 to 25 Loads of Trash and Rubbish Like This Daily . . .

What you see above is a truck-mounted Dempster-Dumpster picking-up, hauling and then dumping a 10 cu. yd. Dempster-Dumpster Detachable Container. Instead of a conventional truck with loading crew, you have a truck-mounted Dempster-Dumpster with only one man, the driver, handling scores of detachable containers. These big containers replace hundreds of unsanitary cans, crates, barrels, etc. at hospitals, schools, market, housing and apartment areas. And your city has no expense of loading. The loading is done for you by the people who create the rubbish. The Dempster-Dumpster services the containers on pre-arranged schedule—handling 15 to 25 daily, one after another, with one man.

The Dempster-Dumpster is mounted on any make truck chassis of suitable size. One Dempster-Dumpster, operated by only one man, the truck driver, by means of hydraulic controls in cab, does the work of 3 to 5 conventional trucks and crews. This Dempster-Dumpster System eliminates trucks and crews standing idle . . . eliminates re-handling of trash and rubbish . . . increases efficiency and sanitation.

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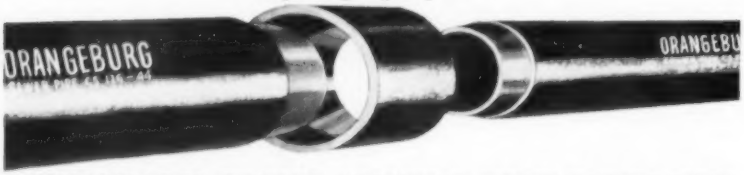

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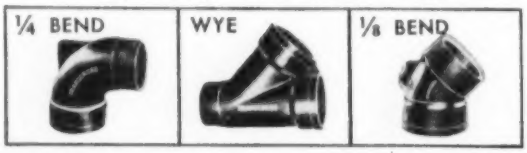

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drains; the drainage of irrigated lands; and the cost of drainage. Written by Harry Burgess and Quincy C. Ayres, this book contains 490 pages (including an excellent bibliography) and is well illustrated. McGraw-Hill Book Co., 330 W. 42nd St., New York. $7.50.

REVISED ICE AND SNOW CONTROL BULLETIN

Recommendations for organization, equipment and practice for ice and snow removal are included in this 20-page third revision of Current Road Problems No. 9 available from the Highway Research Board, 2101 Constitution Ave., Washington 25, D. C. at a cost of 30 cents.

PAVEMENT CRACK AND JOINT MAINTENANCE

Bulletin 78 of the Highway Research Board presents and discusses basic facts pertinent to the problem and describes the various kinds of filling and sealing materials most commonly employed with their capabilities and limitations. 38 pages, paper bound, available from Highway Research Board, 2101 Constitution Ave., Washington 25, D. C.

CANADIAN CONFERENCE ON PRESTRESSED CONCRETE

The proceedings are now available and cover design and construction practices. One paper is devoted to the objections to the method by those who are not entirely sold. A good addition to the literature on this growing subject. Copies can be obtained from the Director, University Extension, University of Toronto, Toronto 5, Ontario, Canada, at a cost of $2.50 in Canadian funds.

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Telescoping type . . . prevents damage to stop or piping . . . large steel upper section will not revolve in base. Bronze-to-iron threads for easy plug or lid removal . . . with or without stationary rod.

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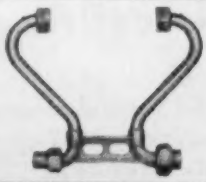

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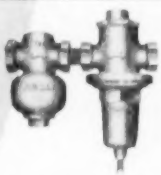

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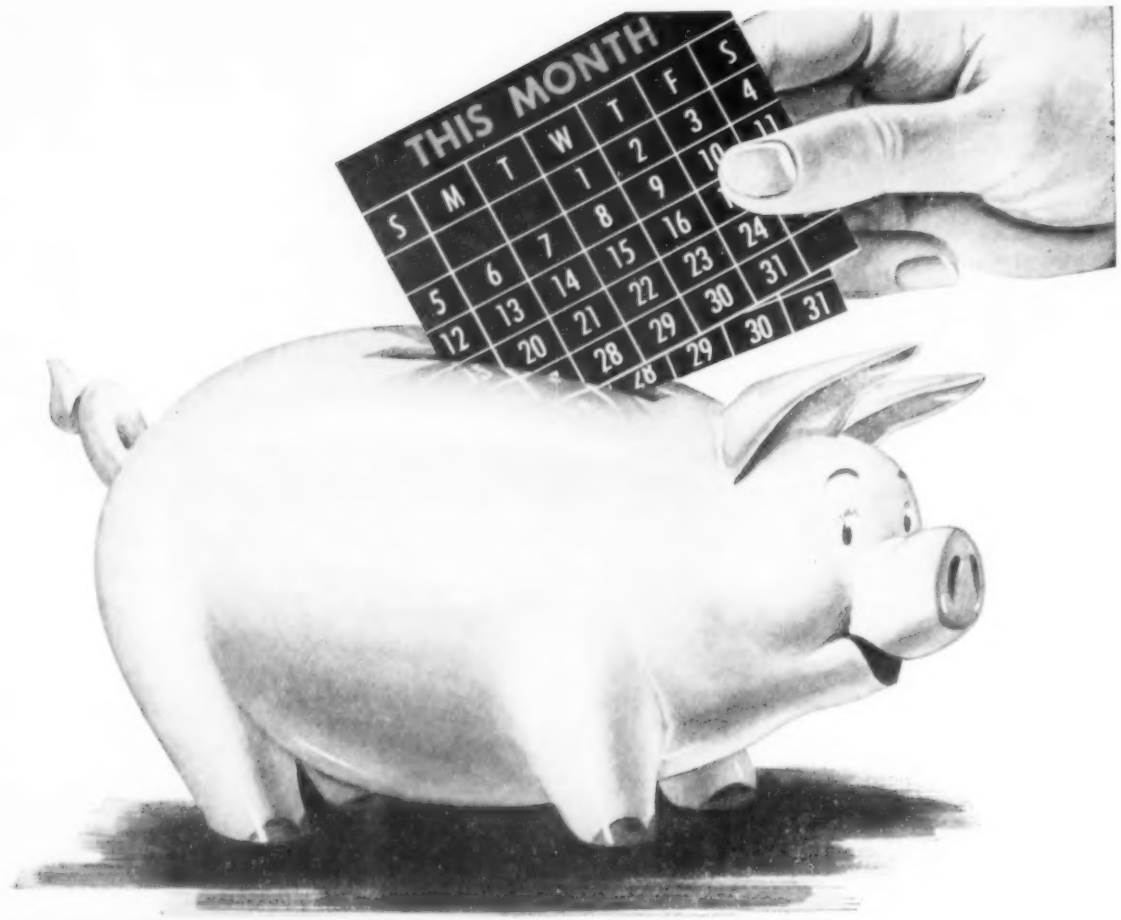

SAVE TIME... only one week needed for new SOIL-CEMENT testing procedures

New short-cut procedures for determining the cement factor in soil-cement construction in sandy soils have been devised by the Portland Cement Association. They save five of the six weeks formerly needed for tests.

The 2,229 sandy soils from the U.S. and Canada previously tested according to standard ASTM-AASHO procedures were analyzed. This analysis showed a correlation between cement factor requirements and (1) maximum density, (2) combined silt-clay content and (3) compressive strength.

Based on these relationships the new procedures provide reliable methods for determining safe cement factors in one week for most sandy soils. In one day one laboratory man can perform all tests needed for most samples except the one for compressive strength. That takes seven days. And much smaller soil samples suffice, too—usually from 60% to 75% less than was formerly required.

Since the advent of scientifically controlled soil-cement construction nearly 20 years ago, more than 6,000 different soils have been tested. For the sandy soils short-cut procedures are now ready.

Investigate this quick, simple method of obtaining cement factors in soil-cement construction. Write for your free copy of a new booklet, "*Short-cut Soil-Cement Testing Procedures for Sandy Soils.*" It is distributed only in the U.S. and Canada.

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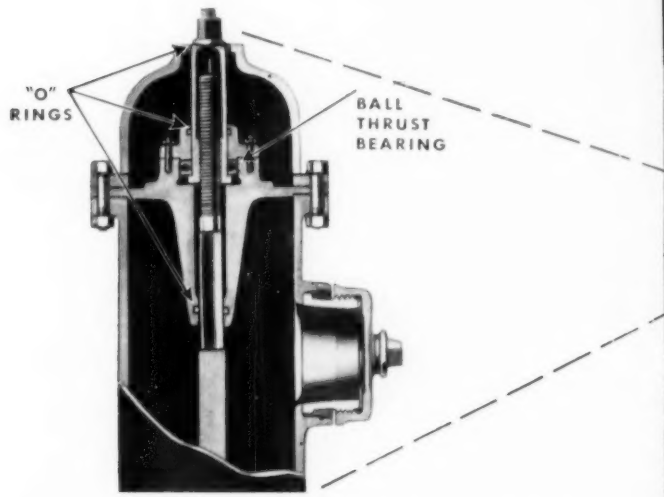
Darling B-50-B's Bring Unique, New Advantages!

Cuyahoga Falls, and hundreds of other cities too, are now installing the new Darling B-50-B hydrants. This dry-top, ball-bearing hydrant opens quicker, operates easier, and eliminates bothersome packing lubrication. Moreover, the special Darling B-50-B "O" rings are insurance against loss of lubricant for threads and bearings . . . *and never let a drop of water reach the operating threads.*



Before you decide on any hydrant or valve, get all the facts on the new Darling B-50-B hydrant and Darling water valves for every service. *Write today!*

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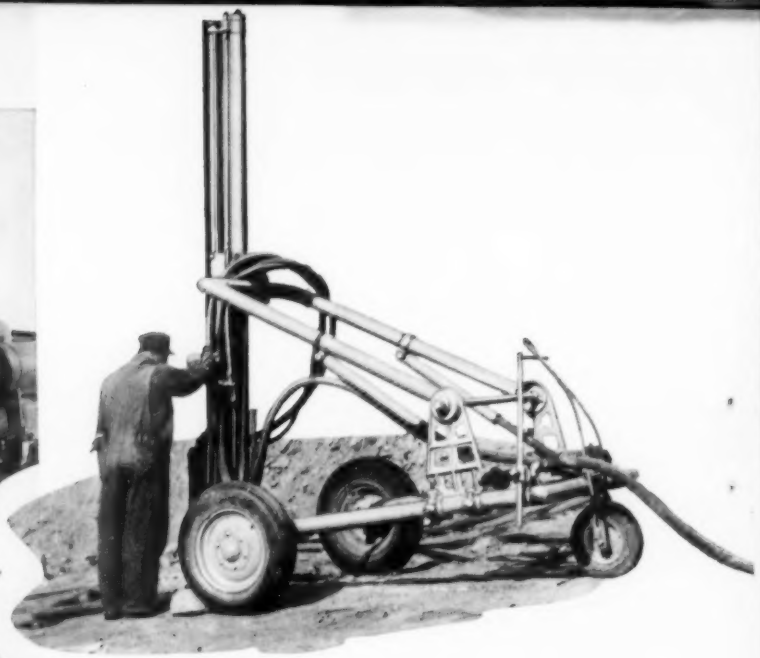

Le Roi-CLEVELAND Clay Digger — at work on a sewer job. Well-balanced for easy handling, these spaders pack plenty of wallop for the stiffest clay. Operators like them, because they can do more work with less effort. A one-piece, bonded, rubber buffer with split steel collars keeps out dirt and grit — makes steel changing faster.

Your air-power operations

Cost Less

Le Roi-CLEVELAND Paving Breakers—are packed with power to make quick work of breaking up the hardest concrete. Sizes range from 18 to 80 lbs. Protective cushion in front end assures long life. Exclusive valving provides an easy-holding action that operators like. All these features help you reduce your costs.

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LE ROI GIVES YOU MORE FOR YOUR MONEY!

More air power!
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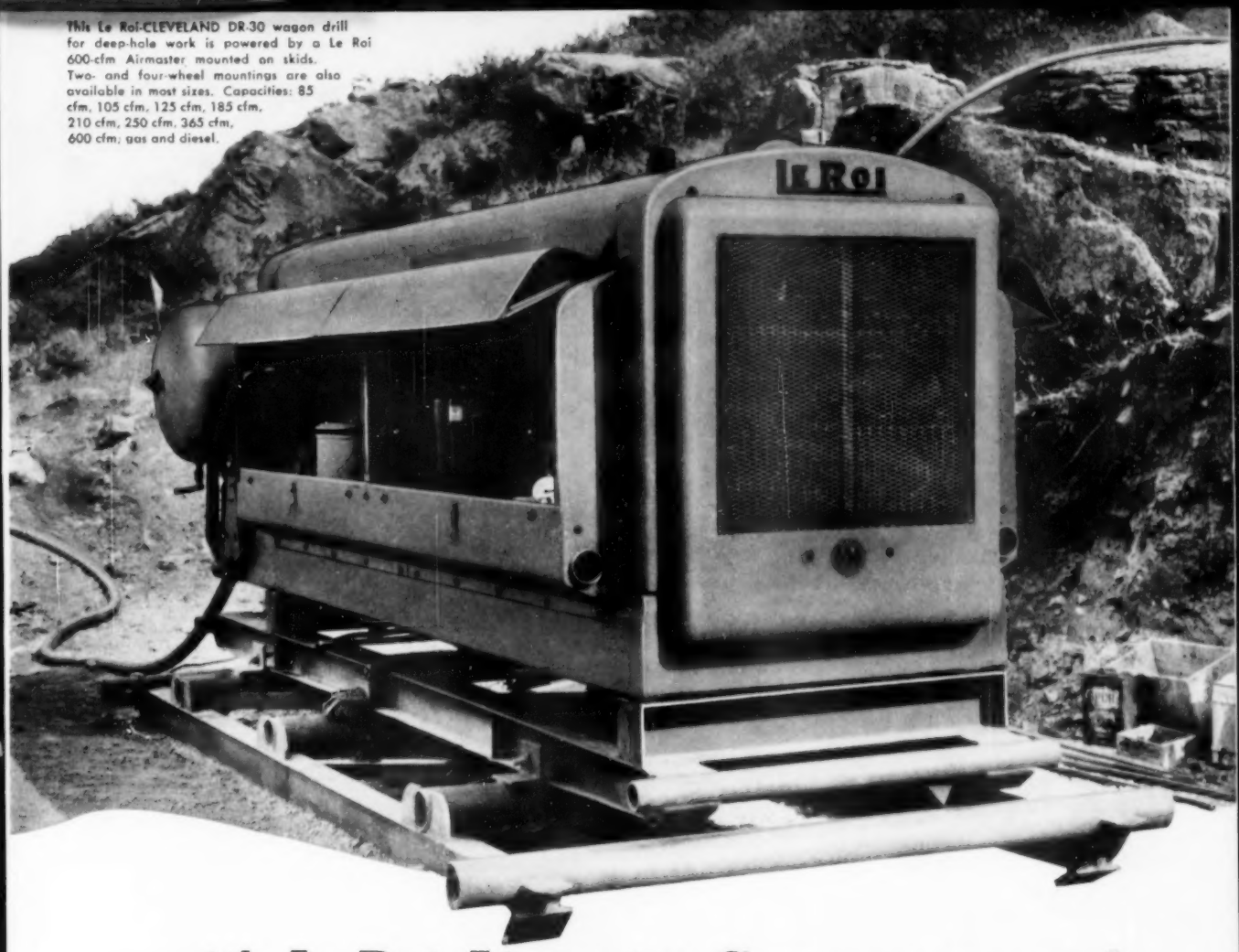
More profits!



This Le Roi-CLEVELAND DR-30 wagon drill for deep-hole work is powered by a Le Roi 600-cfm Airmaster mounted on skids. Two- and four-wheel mountings are also available in most sizes. Capacities: 85 cfm, 105 cfm, 125 cfm, 185 cfm, 210 cfm, 250 cfm, 365 cfm, 600 cfm; gas and diesel.

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AIR POWER is so widely used, because it does so many things — because it saves money

And money-saving air power costs less, when you use Le Roi Airmaster Compressors. Here's why:

- Le Roi, with 8 sizes and 14 models, offers the widest range of portable-compressor sizes available. Now you can match your job requirements exactly, with an Airmaster Compressor that lets you do the most work for the least cost.
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For still better results, still lower costs, use Le Roi-CLEVELAND air tools with your Airmasters. They will drill more rock, dig more clay, break more pavement, tamp more fill for you.

Use this team and you will find, as so many have, that Le Roi gives you more for your money — more air power, more footage, more profits. See your Le Roi distributor or write us for further information.

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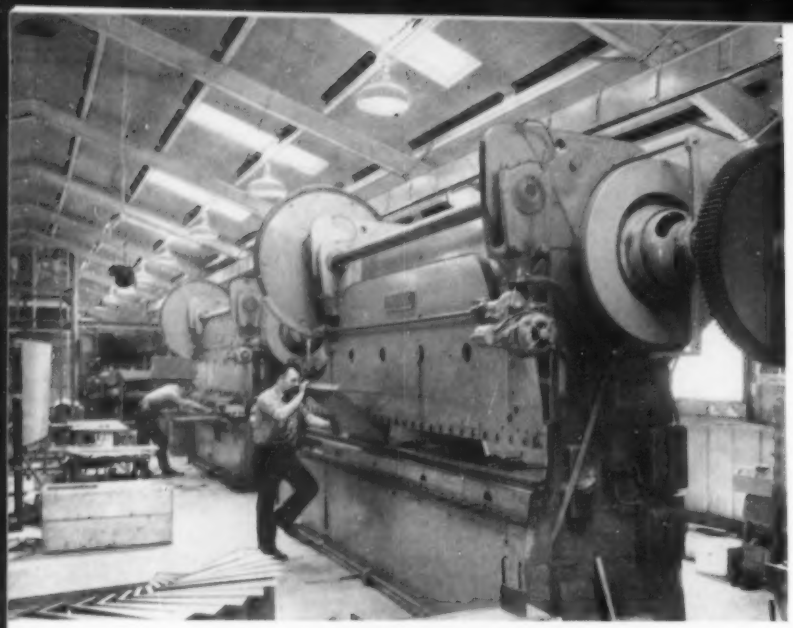

Battery of press brakes in the complete new plant of Lake Shore Electric, Inc., Bedford, Ohio. Butler steel buildings were used throughout . . . saved half the cost of new construction . . . gave Lake Shore a more efficient, better lighted, safer plant.

Buildings too *work harder, earn more*— when they're BUTLER steel buildings

Take a look at the performance of the new Butler-built plant erected for the Lake Shore Electric, Inc., Bedford, Ohio. They formerly occupied 30,000 square feet in a 4-story building—then "expanded" to a 1-story 23,300 square foot rigid-frame Butler steel building.

Production increased! Here is how Mr. S. W. Soos, President of Lake Shore Electric, explains it, "There is less waste motion now that everything here is on one floor. Post-free Butler construction also lets us place machines and materials for the most efficient work flow. Employees appreciate the soft, natural lighting from the Lite-Panls, and overall efficiency is improved by the convenience of our new layout. Yet square foot cost was considerably less than the cost of many common types of construction—only $6.00 per square foot *including* insulation, lighting and even overhead cranes."

Build better—for less money—with Butler steel buildings. They give you every advantage of conventional construction *plus* these profit-producing extras: (1) Your capital investment is lower, (2) Faster erection time puts you in production earlier, (3) steel or aluminum sheeting lowers maintenance costs, (4) pre-engineered Butler buildings do not become obsolete—you can profitably expand, alter or relocate them at any time to meet new demands of our fast-changing economy. Write today for full particulars about Butler buildings and the name of your nearest Butler dealer.

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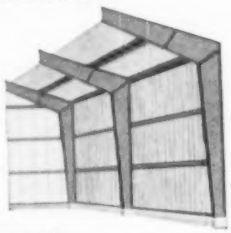
There are no interior posts or columns to waste space and create work-slowing "bottlenecks." Rigid-frame construction also shrinks maintenance costs . . . extends building life.



Fast Erection . . . Easy Expansion

Precision-punched and dimensioned bolt holes speed erection—simplify expansion or dismantling and moving. Galvanized bolts, with Neoprene rubber washers, lock deep-corrugated sheets firmly to the sturdy frame.

Weatherproof Protection

The one-piece, die-formed roof ridge eliminates ridge roll—helps to make the building leakproof and weather-tight.

Triple-Strength Corrugated Sheets

Butler sheeting with deep-formed corrugations on 12-inch centers, is three times as strong as ordinary corrugated sheets. Overlapping corrugations bolt tightly together for maximum strength and weather protection. Your choice of steel or aluminum sheeting.

Attractive Curved Eaves

The neat, die-formed eaves—which bolt to the roof sheets—add to the appearance of Butler steel buildings...increase the strength of the eaves . . . help insure weather-tightness.

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Where corrugated sheets meet windows or the foundation, they are tightly crimped for a snug fit that keeps out snow, moisture and rodents.

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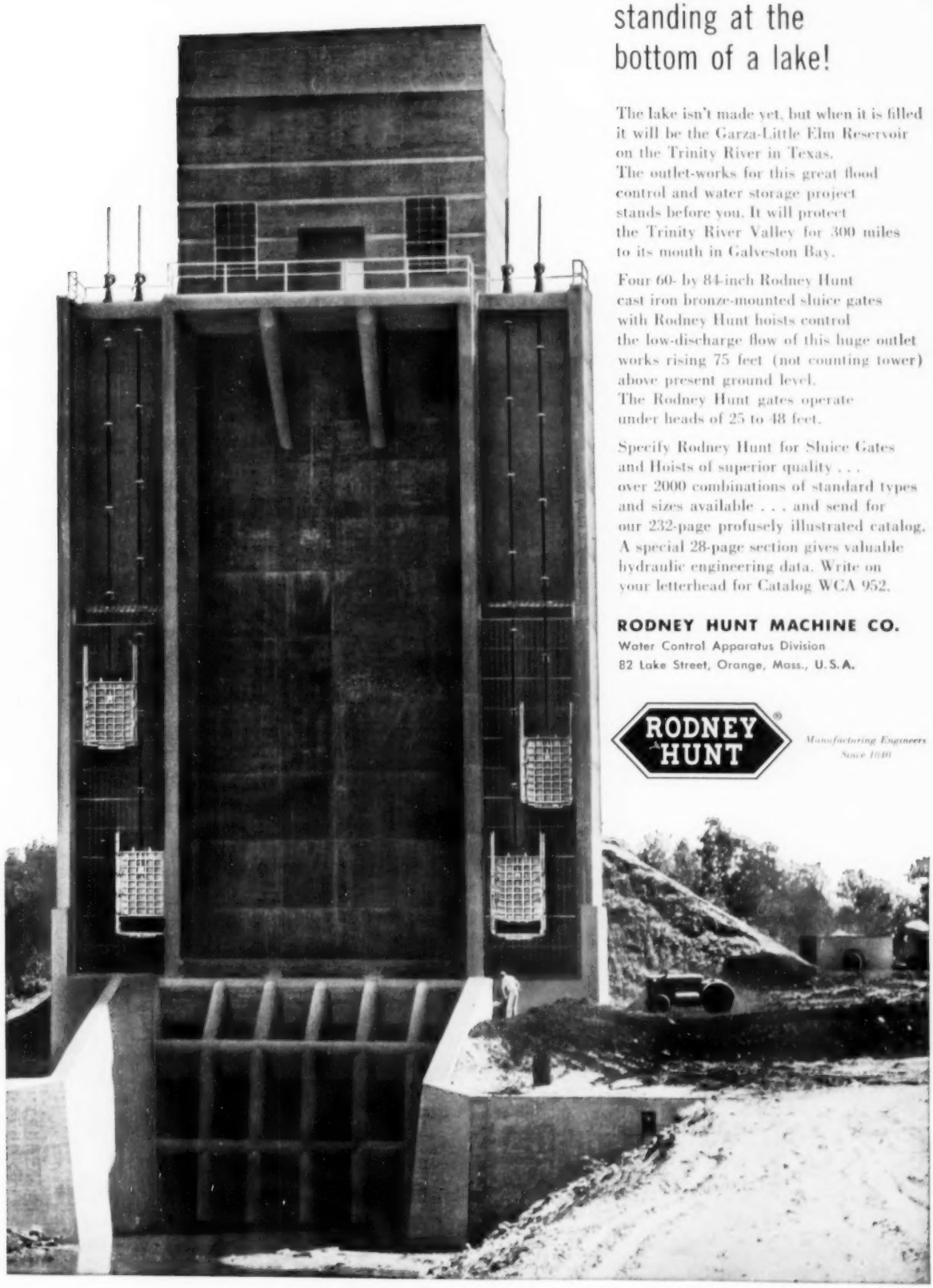

You are standing at the bottom of a lake!

The lake isn't made yet, but when it is filled it will be the Garza-Little Elm Reservoir on the Trinity River in Texas. The outlet-works for this great flood control and water storage project stands before you. It will protect the Trinity River Valley for 300 miles to its mouth in Galveston Bay.

Four 60- by 84-inch Rodney Hunt cast iron bronze-mounted sluice gates with Rodney Hunt hoists control the low-discharge flow of this huge outlet works rising 75 feet (not counting tower) above present ground level. The Rodney Hunt gates operate under heads of 25 to 48 feet.

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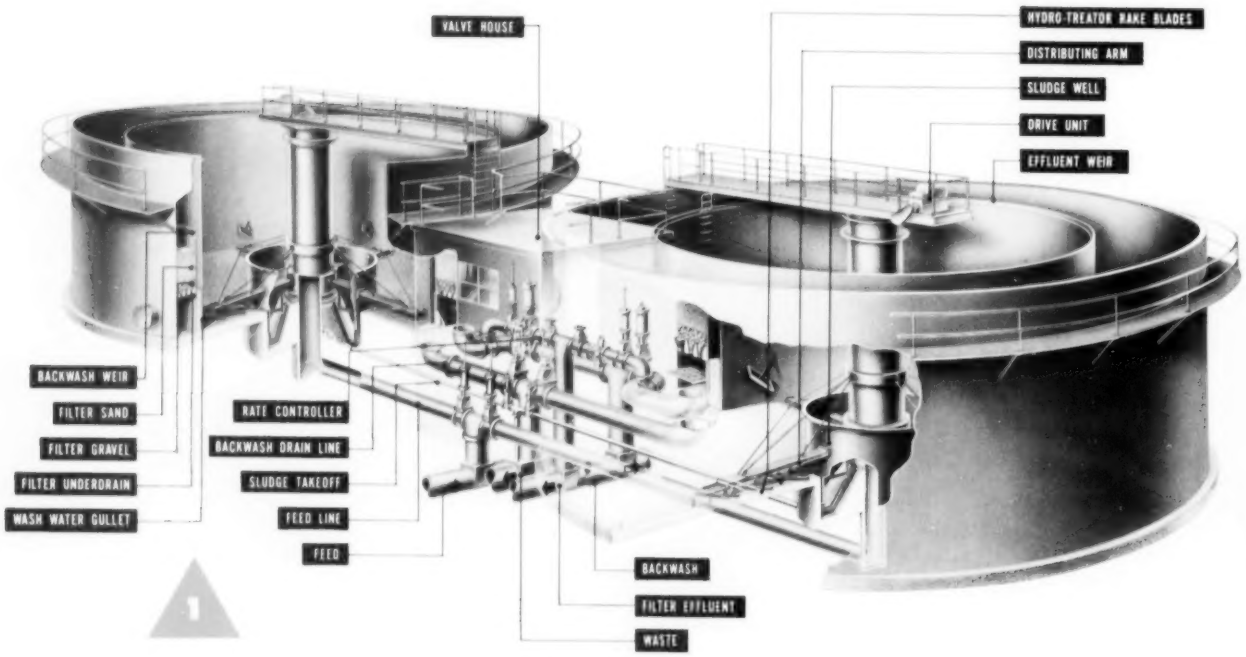
FOR MUNICIPAL AND INDUSTRIAL SANITATION...

These three new Dorr developments are now commercially available to help in the solving of community or industrial sanitation problems. For descriptive Bulletins about this equipment, just return the coupon.



The Dorrco Aldrich PeriFilter System Cuts Filtration Plant Construction Costs up to 40%!

A unique design permits installation of a Dorr pre-treatment mechanism and an annular rapid sand filter in the same welded steel tank . . . valves and piping are greatly simplified . . . reduced head losses and simple operation add up to lower operating costs. Illustration shows two PeriFilters manifolded together to operate in parallel and with Dorrco Hydro-Treators installed for pre-treatment.

Better tools TODAY to meet tomorrow's demand

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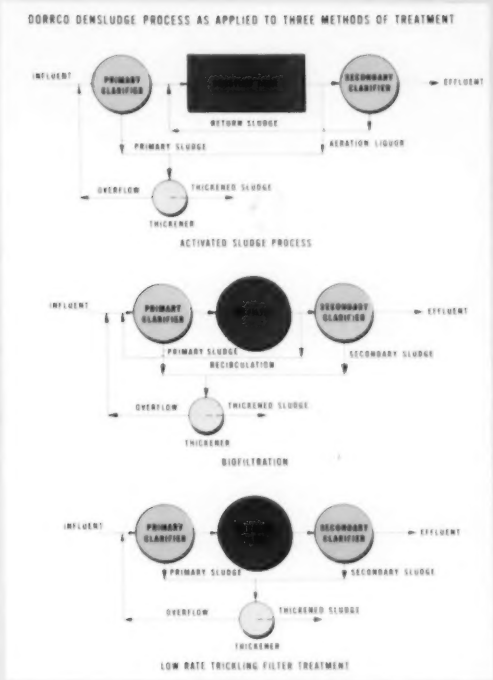

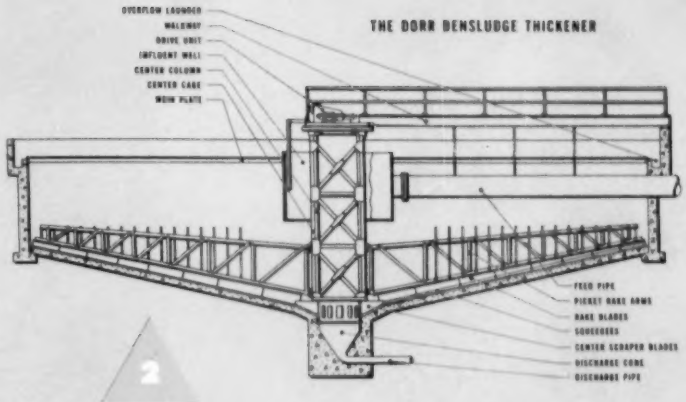

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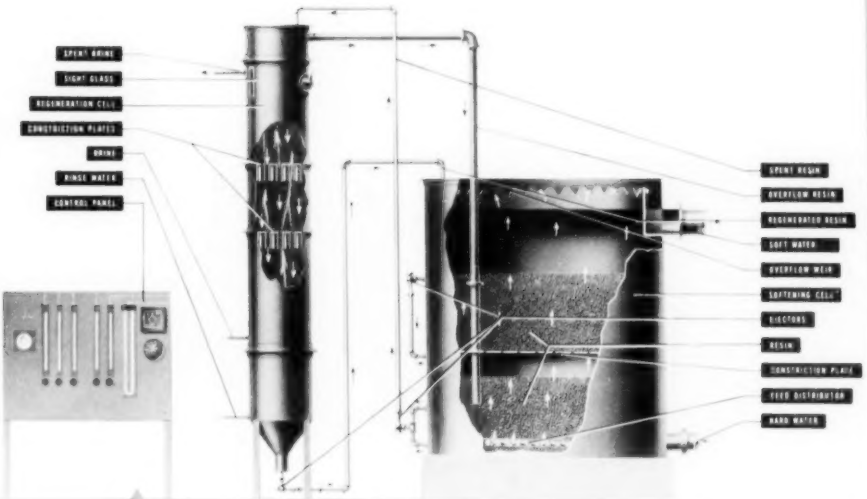
The Dorrco Densludge Process Reduces Sewage Sludge Volume up to 50%!

Clarification and thickening are carried out separately so that maximum efficiency is realized in each operation. Dorr Densludge Thickener produces a concentrated sludge greatly reduced in volume which cuts digester requirements, sludge drying bed area and other sludge handling facilities. Process is equally adaptable to new and existing plants employing primary, activated sludge, Biofiltration or low-rate filter flow-sheets.



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The Dorrco Hydro-Softener Continuously Softens Water Supplies by Base Exchange Resins!

For the first time, base or cation exchange softening can be put on a continuous basis. Installed cost is lower than with a conventional batch exchanger, and greater brine and rinse efficiency result in lower operating costs. The Hydro-Softener produces a continuous supply of softened water at a constant quality.

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- ☐ THE DORRCO DENSLUDGE PROCESS
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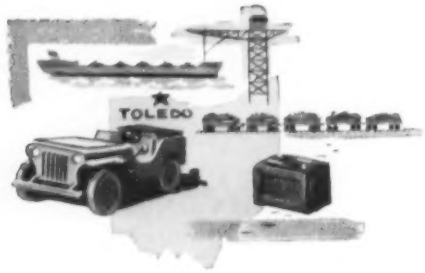
Toledo Prefers Concrete Pressure Pipe



Toledo engineers prefer concrete pressure pipe for the city's water supply mains. In 1948 an 8,600-foot installation, known as the Bancroft Street Crosstown Main, was completed. Since then 24", 36", 48" and 72" concrete pressure pipe has been used in major additions to the city's water supply system. Just recently contracts have been signed by Lucas County authorities and work is in progress on additional projects in the Toledo area, involving 16" and 24" pipe.

There are a number of reasons for Toledo's increasing use of concrete pressure pipe. Sustained high-carrying capacity and long life are two of the most important. Another is low maintenance cost. The original cost is also low and installation is accomplished quickly and easily.

Talk to Toledo engineers when you plan your next water line. You'll learn why they like concrete pressure pipe—not only for transmission lines, but for city distribution mains as well.

Member companies manufacture concrete pressure pipe in accordance with nationally recognized specifications

Concrete PRESSURE Pipe

AMERICAN CONCRETE PRESSURE PIPE ASSOCIATION
228 North LaSalle Street
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RECENT TRADE LITERATURE...

Altitude Valves

New 16-page technical bulletin W-4 fully describes G-A Cushioned Altitude Control Valves, which assure accurate water level control in elevated tanks and reservoirs. Featured in this catalog are illustrations, operating sequence, installation arrangements, general instructions, parts lists and dimensions.

Write to Golden-Anderson Valve Specialty Co., 1244 Ridge Ave., Pittsburgh 33, Pa.

Surge Relief Valves

8-page Bulletin W-2 contains complete information about G-A Cushioned Surge Relief Valves, which automatically protect water lines against excessive pressures caused by surges in the system. Sectional diagrams and installation arrangements are featured.

Write to Golden-Anderson Valve Specialty Co., 1244 Ridge Ave., Pittsburgh 33, Pa.

Pressure Reducing Valves

New 6-page Bulletin W-3 completely describes G-A Cushioned Water Pressure Reducing Valves, which automatically reduce an existing high pressure to a predetermined low pressure. The installation, operation, adjustment, servicing and specifications are fully described.

Write to Golden-Anderson Valve Specialty Co., 1244 Ridge Ave., Pittsburgh 33, Pa.

Solenoid-Operated Valves

Bulletin W-7 contains the latest technical data on G-A Cushioned Solenoid-operated Valves, which can be used not only as spray and quenching valves, but also for 1001 uses in almost every industry where remote control operation is desired. Both the all-bronze valves in sizes ½" to 2" and the IBBM valves in sizes 2½" through 36" are fully described.

Write to Golden-Anderson Valve Specialty Co., 1244 Ridge Ave., Pittsburgh 33, Pa.

Float Valves

G-A Cushioned Float Valves maintain accurate water level control in elevated tanks, reservoirs, coagulating basins, mixing chambers, etc. They are designed for either cold or hot water service in either the quick-opening or throttling design with integral or remote pilot control. Full technical data is contained in Bulletin W-5.

Write to Golden-Anderson Valve Specialty Co., 1244 Ridge Ave., Pittsburgh 33, Pa.

Swing Check Valves

Technical bulletin W-1 describes the G-A Cushioned Swing Check Valves which automatically close to prevent reverse flow on pump shut-down. Design and construction features are shown, along with complete parts list, dimensions and specifications.

Write to Golden-Anderson Valve Specialty Co., 1244 Ridge Ave., Pittsburgh 33, Pa.

Flowtrol Valves

Bulletin W-8 contains the latest technical data on G-A Cushioned Flowtrol Valves, which can be used either to replace troublesome gate valves that require frequent manual opening or closing, or in place of diaphragm valves. Available in either angle or globe body design, the Flowtrol Valve can be easily moved to the fully open or tightly closed position by simply moving a small pilot cock.

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The combined capacity of Roberts-equipped filtration plants is well over 5 billion gallons (5,000,000,000) per day. Regardless of the size of the plant or the nature of the filtration problem, Roberts Filter can be depended upon for equipment that is reliable in years of service.

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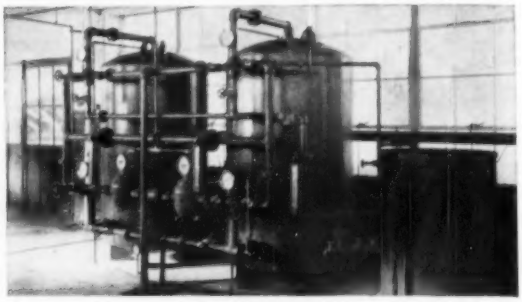

Water treatment has long been a specialty of Roberts Filter. Zeolite water softeners are guaranteed to meet all requirements for which recommended, and are available in a wide range of capacities. Roberts water conditioning equipment is widely used to control precisely the desired chemical content of water for industrial use.

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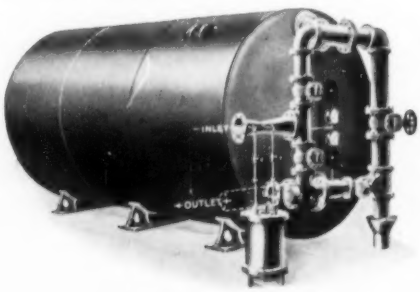
The combination of thoroughly clarified water and efficient recirculation are features for which Roberts pools are famous. Systems for both outdoor and indoor pools are designed and installed by men long experienced in the conditions peculiar to a successful swimming pool installation.

PRESSURE FILTERS



Closed pressure filters have wide usage where gravity filters are not justified. Roberts vertical filters are available in standard types from 12″ to 96″ diameter; horizontal pressure filters are all 8′0″ in diameter and in varying lengths from 10′0″ to 25′0″.

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Roberts Filter

Manufacturing Company · Darby, Pennsylvania

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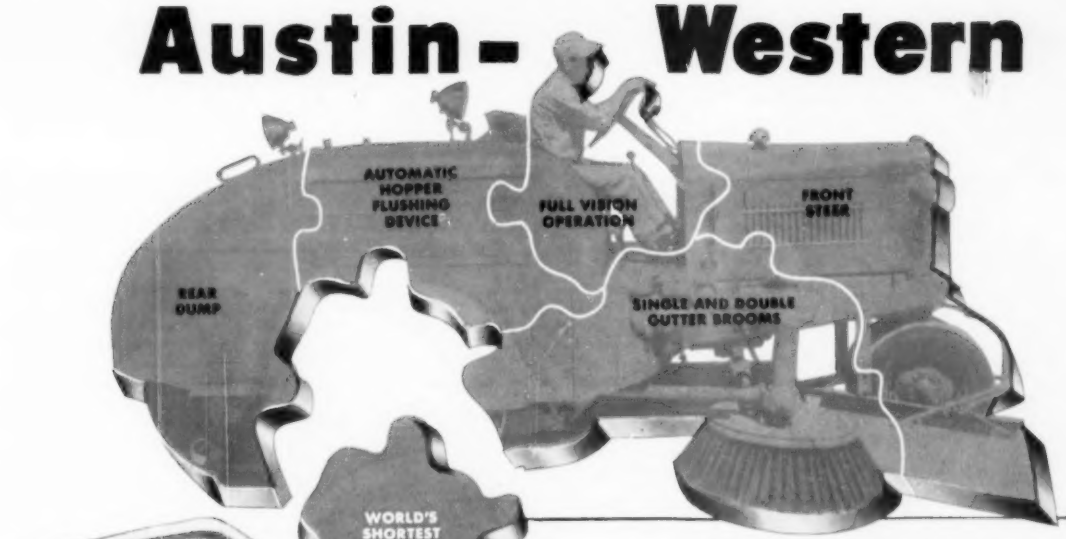
Austin-Western



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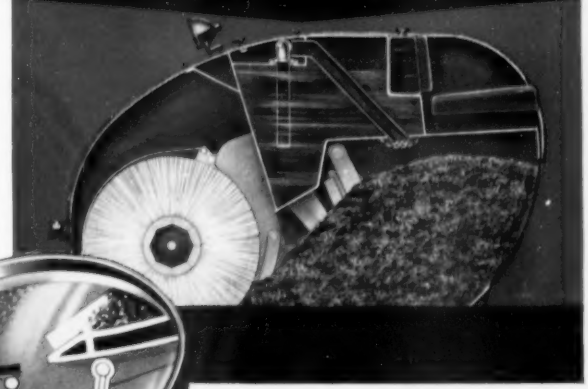
It does the work of a full-length conveyor at a fraction of the cost.

There is no expensive conveyor or elevator in the Model "40"—no complicated, troublesome mechanism to repair and maintain. The rear broom picks up the material on the street and retains it until it passes over the Deflector Bar which is adjusted to just touch the ends of the broom fibre.

From spray bar to rear broom, the Model "40" is engineered for efficient, low cost, trouble free performance. A catalog which tells the whole story is yours for the asking . . . from us or your nearby A-W distributor.

Here's the "Inside" story



All street dirt—including bricks, bottles, cans and sticks—passes between the exclusive, patented Deflector Bar and the broom, then is "flicked" forcibly into the forward end of the hopper in a steady stream.

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New Bulletin Introduces Dorrco Aldrich PeriFilter System

21. By combining a pre-treatment mechanism and an annular rapid sand filter in a single unit, the Dorrco Aldrich PeriFilter system offers a substantial reduction of initial installation costs and permits unusual design flexibility for treatment of municipal and industrial water supplies. For details on the system, including instrumentation and operation get Bulletin No. 9042 by writing The Dorr Co., Barry Pl., Stamford, Conn., or check the coupon.

How to Eliminate Seepage On Construction Projects

22. Labyrinth waterstops are easily installed to provide the answer to the seepage problem and simplify form work on all types of construction jobs. Investigate their use for water and sewage plants, reservoirs, swimming pools, etc. For full data check the coupon or write to Water Seals, Inc., 9 So. Clinton St., Chicago 6, Ill.

Lightweight Generator Gets Power Where You Need It

56. The Winco light-weight carryable generators with "Super-Charged" power provide economical answers to your power requirements on-the-job and are ready for dependable operation during emergencies. Literature on all models and useful accessories is available from Wincharger Corp., Sioux City, Iowa. Check the coupon today.

Data on New Pressure Joint For Vitrified Clay Pipe

183. Specifications, instructions and case histories of Vitrified Clay Pipe Installations utilizing the new Pressure Joint are available in a fully-illustrated 6-page brochure. Especially effective in high water table areas, the pressure joint employs a rubber gasket inflated by hand with a special grout compound to form an infiltration-proof, self-aligning joint. This highly informative brochure is available from a number of member manufacturers of the Clay Sewer Pipe Assn.

Helpful Reference on Swimming Pool Equipment

24. A complete reference catalog of swimming pool supplies, chemicals and equipment is available from Modern Swimming Pool Co., Inc., 1 Holland Ave., White Plains, N. Y. Detailed information covers filters and accessories, all types of fittings and equipment and helpful suggestions on chemical treatment and pool maintenance. Get your copy of this 28-page book by checking the coupon.

Weed Killing Case Histories

26. Low cost weed and grass control with Du Pont "Telvar" W weed killer is demonstrated by full-color photographs in a new booklet issued by Grasselli Chemicals Dept., E. I. Du Pont de Nemours & Co., Inc., Wilmington 98, Del. Text includes application methods for best results. Check the coupon for your copy.

Attachments Keep Snow-Thrower On Job the Year 'Round

46. A variety of attachments designed to fit the rugged tractor unit of the Maxim Snow Thrower make it an all-year worker ready for mowing, cutting, dozing, towing and rolling. Full details on these economical snow throwers and their useful attachments are covered in bulletins offered by Maxim Silencer Co., 85 Homestead Ave., Hartford, Conn. Check the coupon for this data.

Modern Garage Designs Provide Gas Fume Removal

51. It's easy to get rid of gas fumes with National carbon monoxide exhaust gas removal systems. Complete packaged kits for installing either overhead or underfloor systems are described in Bulletin 112, issued by National System of Garage Ventilation, Inc., 138 W. William St., Decatur, Ill. Check the coupon for full data.

Hoist Equipment and Catch Basin Cleaners for Public Utilities

54. The complete line of Silent Hoist winches for trucks and tractors, "Krane Kars", truck towers, catch basin cleaners and other equipment of interest to municipalities are illustrated in Bulletin 54A. Use coupon or write to Silent Hoist & Crane Co., 844 63rd St., Brooklyn 20, N. Y.

MORE LISTINGS ON PAGES 44 TO 62

Graver Reactivator Package Water Treatment Plant

58. Specially designed "package" plants for treating up to 2 MGD are described in literature of the Graver Water Conditioning Co., 216 W. 14th St., New York, N. Y. All necessary components are contained, including chemical feeders, Reactivators, filters, piping, valves, controllers and accessories. For full data check the coupon or write to the manufacturer.

How Electro-Matic Controllers Solve Problem of Congested Intersections

60. Traffic control systems regulated by Electro-Matic Controllers continually adjust to changing traffic patterns to clear traffic faster and relieve the problem of congested intersections. Be sure to investigate this method of expediting traffic flow at difficult intersections. Get full data from Automatic Signal Div., Eastern Industries, Inc., East Norwalk, Conn. Just check the handy coupon.

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66. Get latest data on Jones chlorine service for liquid chlorine, calcium hypochlorite and sodium hypochlorite packaged in lots best suited for your needs. Five strategic locations serve all parts of the country. Check the coupon or write John Wiley Jones Co., Caldeonia, N. Y.

Easy Reference on Durable Gratings and Treads

90. An easy-to-use catalog containing illustrations, descriptions and complete engineering data on grating-flooring, treads and floor armoring of riveted, press-locked and welded types has been published by Irving Subway Grating Co., Inc., 50-09 — 27th St., Long Island City, N. Y. To get this useful reference write to the manufacturer and ask for Catalog F400 or check the handy coupon.

5-54

USE THIS COUPON to get detailed information on products and materials mentioned in this issue. Circle numbers below and mail today.

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Booklets from pages 42 to 62:

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233 236 238 239 247 249 259 261 263 267
271 273 274 278 279 281 283 287 288 292
294 297 299 302 309 311 312 315 319 326
327 331 342 349 352 361 362 366 368 370
372 373 374

New Products, pages 193 to 199:

5-1 5-2 5-3 5-4 5-5 5-6 5-7 5-8 5-9 5-10
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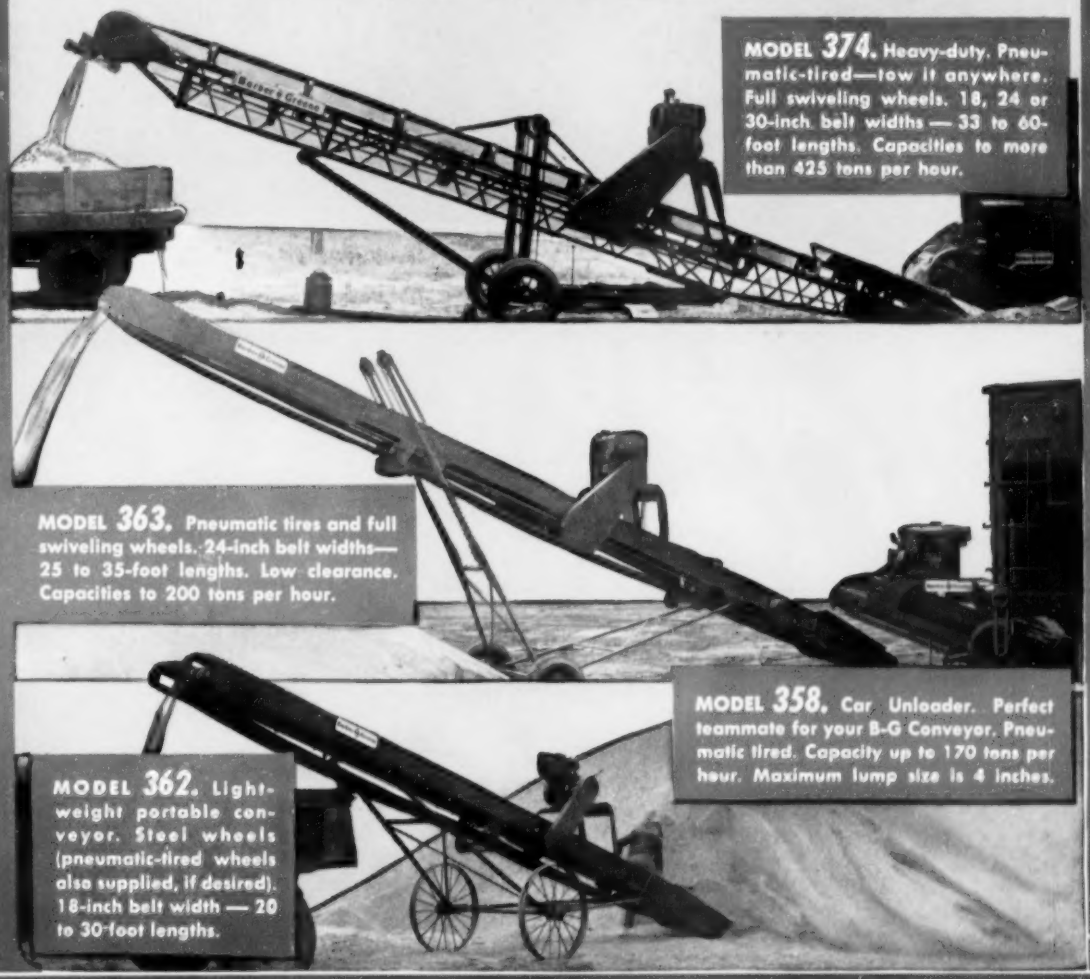
In addition to the models shown, Barber-Greene also builds larger capacity portable conveyors. Why not check with your B-G distributor for complete information on portable conveyors?



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To order these helpful booklets check the coupon on page 42.

Keeps 4 Backfillers Busy

IN OMAHA, NEBRASKA, the Metropolitan Utilities District keeps 4 CLEVELAND Backfillers busy on construction jobs for gas, sewer and water lines.

The photograph shows how easily the Model 80 Backfiller is operated by only one man. It also shows how the 80, traveling parallel to the trench as it works, holds to an absolute minimum any interference with the highway's normal traffic capacity.

The 80 is not only cleanly filling this good sized trench, it is also compacting it simultaneously with its tamper unit, a standard accessory feature of this versatile machine. The results it is obtaining clearly illustrate its ability to backfill fast and efficiently and at the same time do an outstanding job of compacting the fill. Traveling continuously as it performs both these operations, it conserves on manpower and eliminates the need for attendant equipment.

In addition to backfilling and compaction these Model 80's do side crane work of all kinds, such as the handling and installation of cast iron, steel and concrete pipe, valves, etc.

The repeated purchases of these machines by this municipal utilities body are evidence of the Model 80's ability to deliver consistently satisfactory results through consistent, outstanding performance on a wide variety of job types and sizes.

Write for descriptive literature and specifications, or get the full story on CLEVELANDS from your local distributor.

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NEW LISTINGS (Cont.)

How to Use Lime For Stabilization of Roads

77. In a comprehensive 68-page book, the National Lime Assn., 925 — 15th St., N. W., Washington 5, D. C., presents the whole story of lime stabilization of roads. Application methods, means of evaluating lime-soil mixes, job descriptions and cost data are included in this valuable book. Check the coupon for a copy.

Data Offered on Root-Proof Pipe and Fittings

352. Orangeburg sewer pipe and fittings with root-proof Taperweld joints are described in a comprehensive bulletin offered by Orangeburg Mfg. Co., Orangeburg, N. Y. Detailed information is included on layouts and installation for sewerage and drainage. Get 12-page Catalog No. 306 by checking the coupon.

Engineering Data on Level and Pressure Telemeter

82. The application of Chronoflo Telemetering to level control in tanks and reservoirs, to pressure control in discharge lines, distribution systems and booster stations and to automatic pump control are covered in 8-page Bulletin 230-K10 of Builders-Providence, Inc., Providence, R. I. Get this bulletin by checking the coupon.

Asphalt Additive Withstands Heating

95. A material to increase bonding properties and which is heat stable in asphalt at elevated temperatures is described in a new bulletin issued by Carlisle Chemical Works, Inc., Reading, Pa. Information on methods of use and full reports on extensive tests of this concentrated additive, called "Pave", are covered in the new bulletin. Check the coupon for a copy.

Technical Supplement Describes Mixing, Coagulation and Flocculation

104. A new Technical Supplement issued by American Well Works, Aurora, Ill., provides full engineering data on slow mix equipment for chemical mixing, coagulation and flocculation. Design details, specifications and useful general data are included. Check the coupon for your copy.

For Fast, Smooth Pipe Cuts

118. The Wachs National air-powered pipe saw cuts cast iron or steel pipe from 10" to 48" diameter, leaving clean-cut, milled edges. Get full information on this unit from E. H. Wachs Co., 1525 N. Dayton St., Chicago 32, Ill., by using the coupon.

Vertical Turbine Pumps For Municipal Water Supply

121. Engineering data on vertical turbine pumps for deep or shallow well operation in capacities ranging from 50 to 10,000 gallons per minute, oil or water lubricated, are covered in a booklet issued by Worthington Corp., Vertical Turbine Division, Succasunna, N. J. Check the coupon today for this helpful information.

Auxiliary Electric Power For Public Utilities

130. Full descriptive information on Onan electric plants for every public utility need will be found in literature issued by D. W. Onan & Sons, Inc., Minneapolis 14, Minn. Be sure you have latest data on standby plants and controls for emergency electric power. Check the coupon now.

Data on the Ratochlor Chlorine Dispenser

134. Complete descriptive literature on Ratochlor chlorinators which feature corrosion resistance, safety, dependability and direct, visible flow measurement is available from Fischer & Porter Co., Hatboro, Pa. Details of operation, applications and full engineering data are furnished. Write today or check the coupon for latest information.

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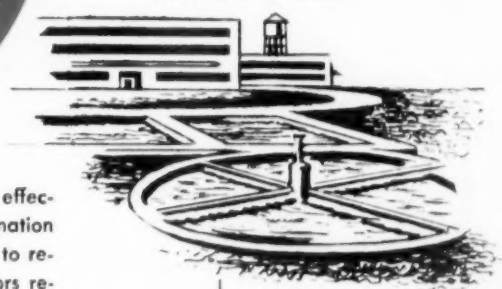

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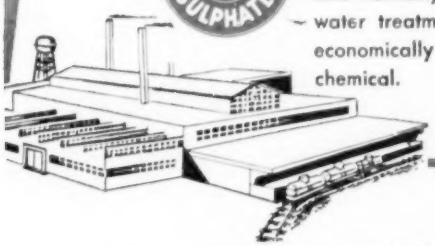

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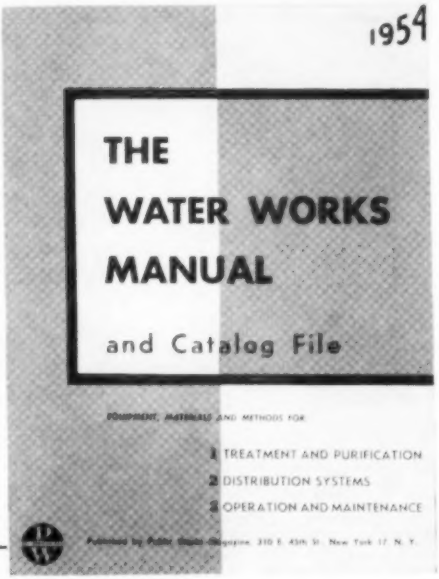

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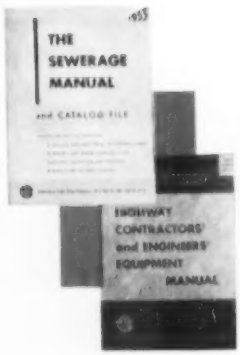

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What You Should Know About Use of Power Cranes and Shovels

107. A series of eight articles discussing the use and application of power cranes and shovels has been compiled under one cover by the Koehring Co., Milwaukee 16, Wis. This 32-page booklet covers the basic principles of operations and cost, safety consideration and factors to consider in equipment selection. Get your copy of this valuable booklet by checking the coupon.

●

WEED CONTROL

Investigate "Tifa" For Insect Control

45. With "Tifa", the Todd Insecticidal Fog Applicator, chemicals for insect control are distributed as a true, clean fog which effectively penetrates all spaces where insects may hide. For full data on the use of this machine in public health programs, write Combustion Equipment Div., Todd Shipyards Corp., 81-16 45th Ave., Elmhurst, N. Y., or use the coupon.

Chemical Weed Killers Are Fast and Effective

117. Be sure to check Polybor-Chlorate and concentrated Borascu for fast, economical non-selective destruction of weeds and grasses. Features and applications of these effective products are outlined in bulletins available from Pacific Coast Borax Co., 630 Shatto Pl., Los Angeles 5, Calif. Check coupon for full data.

What You Should Know About Chemical Weed Control

132. In a convenient 44-page book, the C. B. Dolge Co. gives full details on spraying procedures and chemicals to use for control of lawn and roadside weeds, ragweed eradication and insect control in turf. Get your copy by checking the coupon or write C. B. Dolge Co., Westport, Conn.

●

WATER WORKS

Data on Cutting-In Valves, Repair Sleeves and Accessories

33. A variety of Clow products for installation and repair of cast iron pipe lines, including the Eddy cutting-in valve and sleeve, split sleeves for pipe repair, test plugs, valve boxes, Strickler pipe cutters and other fittings and accessories are featured in literature available from James B. Clow & Sons, Inc., Box 6600-A, Chicago 80, Ill. Check the coupon.

What You Should Know About Chemical Proportioning Pumps

38. In an attractive new bulletin you will find latest information on the Heavy-Duty Chem-O-Feeder, plus many installation diagrams, construction and operating details, list of chemicals fed and other helpful information on constant rate and flow proportional chemical feeding. Get your copy from Proportioneers, Inc., Providence 1, R. I., by checking the coupon.

Technical Data on Fluorides And Other Chemicals

48. Technical data on fluorides and other chemicals will be found in a comprehensive booklet issued by Blockson Chemical Co., Joliet, Ill. This helpful 60-page booklet includes a great deal of general information of value to water works men. Get a copy by checking the coupon.

Helpful Data on Water Works Products

49. A completely new catalog covering the entire line of water distribution and service products offered by the Mueller Company, of Decatur, Ill., is now available to engineers and water works superintendents. The 328-page catalog features an easy-to-use sectional indexing arrangement to facilitate quick reference to any of the hundreds of products listed. A large section of useful engineering information is included. Check the coupon today.

Painting Water Tanks For Longer Protection

52. High labor costs demand special consideration when painting elevated water tanks. This and other factors involved in proper paint selection are discussed in a bulletin issued by Jos. Dixon Crucible Co., Jersey City 3, N. J. Helpful specifications for repainting water tanks are also included. Check the coupon today.

Efficient Coagulation With Ferri-Floc

69. Advantages claimed for Ferri-Floc as a coagulant include wide pH range, quick floc formation, manganese removal, control of certain tastes and odors, plus other aids in high quality water production. Check coupon for complete Ferri-Floc data. Tennessee Corp., Grant Bldg., Atlanta, Ga.

96 Page Book Helps Solve Water Problems

71. pH and Chlorine Control. A discussion of pH control and description of comparators, colorimeters and similar devices. A 96 page booklet. W. A. Taylor & Co., 7304 York Road, Baltimore 4, Md.

Engineering Facts About Transite Pipe

83. This compilation of Johns-Manville's "Engineering Facts" series presents concise, factual information about Transite's many economic and engineering advantages, and includes informative case histories plus dimensions and data for your files. Write Johns-Manville, Box 290, New York 16, N. Y., or use the handy coupon.

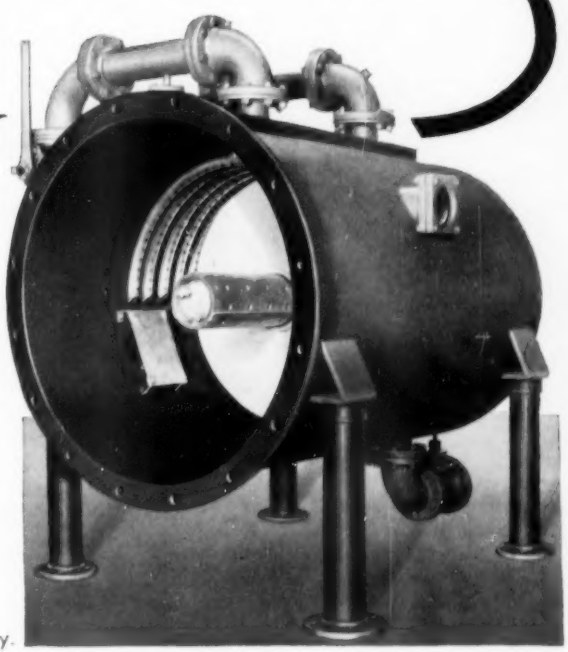
Engineering Data on Diatomite Filters

139. Get complete data on the Sparkler model SC-J diatomite slurry feed filter for swimming pools from the Sparkler Mfg. Co., Mundelein, Ill. Check the coupon for full information including table of filter sizes and capacities, space required and filter operation.

A new trend in municipal water filtration —

The SPARKLER DIATOMITE FILTER MODEL SCJ

has been highly successful in installations now in operation



Reduced operating cost due to long filtering cycles and fast backwash cleaning, together with a remarkably low bacteria count requiring a minimum of chlorination are features that make this new type filter worthy of the attention of all waterworks engineers.

Practically any volume of city water can be filtered economically in the Sparkler SCJ filter. Single units capable of handling 5,000,000 gallons of water a day are available. Multiple units can be engineered into a system for larger requirements.

Less than 0.2% of water is required to backwash and clean the largest filter units and a complete fresh precoat of diatomite can be applied and the filter ready to resume operation in 15 minutes.

Operators can be easily trained, no highly skilled specialized personnel is required to insure efficient performance.

Write for plans and prices on your requirements. Address Dan Baldwin for personal service.

SPARKLER MANUFACTURING CO.

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Manufacturers of industrial filters for over a quarter of a century.

To order these helpful booklets check the coupon on page 42.

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TOLEDO
PIPE CUTTER
for Cleaner Smoother Cut-offs!

Heavy Duty Wheel and Roller

★ Positive clean-cutting action.
★ Hooks on pipe easily . . . tracks perfectly . . . sturdy malleable frame formed to fit the hand and guaranteed warp-proof.
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Water Treatment Unit For Small Supplies

87. A complete-package water treatment unit to treat 5 to 100 gallons per minute is described in Bulletin 1845, issued by Infilco Inc., Box 5033, Tucson, Ariz. Unit softens, clarifies, sterilizes or removes organic matter, tastes or odors. Requires a minimum of attention. Investigate this unit whenever dependable treatment is needed for small domestic supplies. Check the coupon today.

Useful Data on Butterfly Valves

100. Complete descriptions and tables of dimensions on the full line of Rockwell Butterfly Valves is contained in several bulletins published by the company. Construction details and special control features are illustrated. Write W. S. Rockwell Co., Eliot Street, Fairfield, Conn.

Rapid Sand and Pressure Filter Data

109. Rapid sand filters. A complete line of vertical and horizontal pressure filters, wooden gravity filters, and filter tables and other equipment. For engineering data, write Roberts Filter Manufacturing Co., 640 Columbia Ave., Darby, Pa.

Specs for Gate Valves

112. Rigidly inspected gate valves for pressures up to 175 lbs. by R. D. Wood Co. Sizes 2" to 30"; for any standard type joint. R. D. Wood Co., Public Ledger Bldg., Philadelphia 5, Pa.

Comprehensive Data on Cast Iron B & S Pipe

114. Full specifications, including A.S.A. which give all dimensions of standard and alternate patterns of American Mono-Cast Centrifugal Bell and Spigot Pipe in 3" to 48" sizes, will be found in a comprehensive booklet furnished by the American Cast Iron Pipe Co., Birmingham 2, Ala. Check the coupon for your copy.

Discussion of Ranney Method For Municipal Water Production

116. A very interesting study of municipal and industrial water supply problems and a complete discussion of Ranney Collectors for water production will be found in a 20-page booklet published by Ranney Method Water Supplies, Inc., Box 277, Columbus 9, Ohio. Water quality, construction methods, costs, performance and other topics are considered. Check the coupon to get your copy.

Pipe Detector Determines Exact Location and Depth

120. Determination of the exact location and depth of buried pipes, valves, service cables and other metallic objects can save costly digging and unnecessary damage. Your work can be speeded when you use the Detectron pipe detector, which features simple operation, shielding to avoid static interference, economical unit construction and a lifetime guarantee. Get full data from Detectron Co., 5631 Cahuenga Blvd., No. Hollywood, Calif., by using the coupon.

How Accurate Boring Speeds Underground Pipe Installations

135. Interesting charts showing earth boring costs, speed and accuracy for holes from 2½" to 14½" diameter and up to 80 feet long are included in 16-page Catalog No. 8 issued by Hydrauger Corp., 681 Market St., San Francisco 5, Calif. Specifications and general operating instructions are also covered.

How Engineers and Contractors Can Get This Comprehensive Water Control Apparatus Catalog

141. A 250-page catalog showng the full scope of Rodney Hunt water control apparatus is now available for distribution to consulting engineers, contractors and others actively engaged in water control construction work. Hundreds of diagrams, detailed descriptions and specifications show all types of sluice gates and related items, and a special section provides helpful engineering data. Send your request on business letterhead or use the coupon, stating your occupation. Rodney Hunt Machine Co., 7 Water St., Orange, Mass.

"Ring-Tite" Joints for Fast Valve Installation

140. Rensselaer valves and hydrants are now furnished with Ring-Tite ends for quick and simple installation with Transite pipe. Gate valves are available in sizes 4" through 12" for Class 150 Transite pipe; 4" and 5" fire hydrants for connection with 4", 6" and 8" pipe. Get Bulletin M-1 from Rensselaer Valve Co., Troy, N. Y., by checking the coupon.

Faster Pipe Laying With Precaulked and Threaded Joints

148. McWane 2" cast iron water pipe with threaded joints and precaulked bell and spigot pipe are described in folder WM-47. Additional data on 3" to 12" centrifugally cast pipe and fittings in folder WL-47, both issued by McWane Cast Iron Pipe Co., Birmingham 2, Ala.

What You Should Know About Fluoridation and Fluoridators

155. Two helpful publications issued by Wallace & Tiernan titled "Fluoridation" and "Fluoridators" show the development of fluoridation, list the chemicals and dosage normally used, and give full technical data on solution feed and dry feed fluoridators. Be sure to get these publications from Wallace & Tiernan by checking the coupon today.

Helpful Data on Sluice Gates

158. In a well-organized 48-page catalog you will find complete engineering and design data on Pekrul sluice gates, headgates, automatic flap gates, lifts and accessories. Numerous models in 6" to 92" sizes are available, and all pertinent data will be found in this helpful booklet. Write Morse Bros. Machinery Co. Denver, Colo., or use the coupon.

What You Should Know About Steel Reservoirs and Standpipes

163. In a handsome 24-page booklet "Horton Steel Reservoirs and Standpipes," the Chicago Bridge & Iron Co., Chicago 4, Ill., shows installations from 50,000-gal. to 10,000,000-gal. capacity with several types of roof and special architectural features. Engineering data includes information on capacities, foundations and improved surface protection. Check the coupon to get your copy.

Heavy-Duty Pipe Cutter Works In or Out of Trench

164. Built to stand the most severe service, the all-purpose Ellis & Ford pipe cutter is easy to use in tight places, works in or out of trench. Full details on cutter and interchangeable parts in Catalog 25, available by checking coupon. Ellis & Ford Mfg. Co., Ferndale 20, Mich.

What You Should Know About Meter Setting and Testing Equipment

166. Complete details on all equipment and proper methods for meter testing and installation are included in an excellent book published by Ford Meter Box Co., Wabash, Ind. All waterworks men concerned with setting and testing of water meters should have a copy of this book. Write for Catalog No. 50.

Engineering Data On Mechanical Joint C.I. Pipe

183. General specification, weights and dimensions of mechanical joint cast iron pipe and fittings are furnished in a 32-page booklet issued by Alabama Pipe Co., Anniston, Ala. Get this helpful data by checking coupon.

Efficient Underdrains for Rapid Sand Filters

239. Be sure you have engineering data on vitrified clay underdrains, efficiently designed for filtering and backwashing. Check the coupon or write F. B. Leopold Co., Inc., Dept. PW, 2413 W. Carlson St., Pittsburgh 4, Pa.

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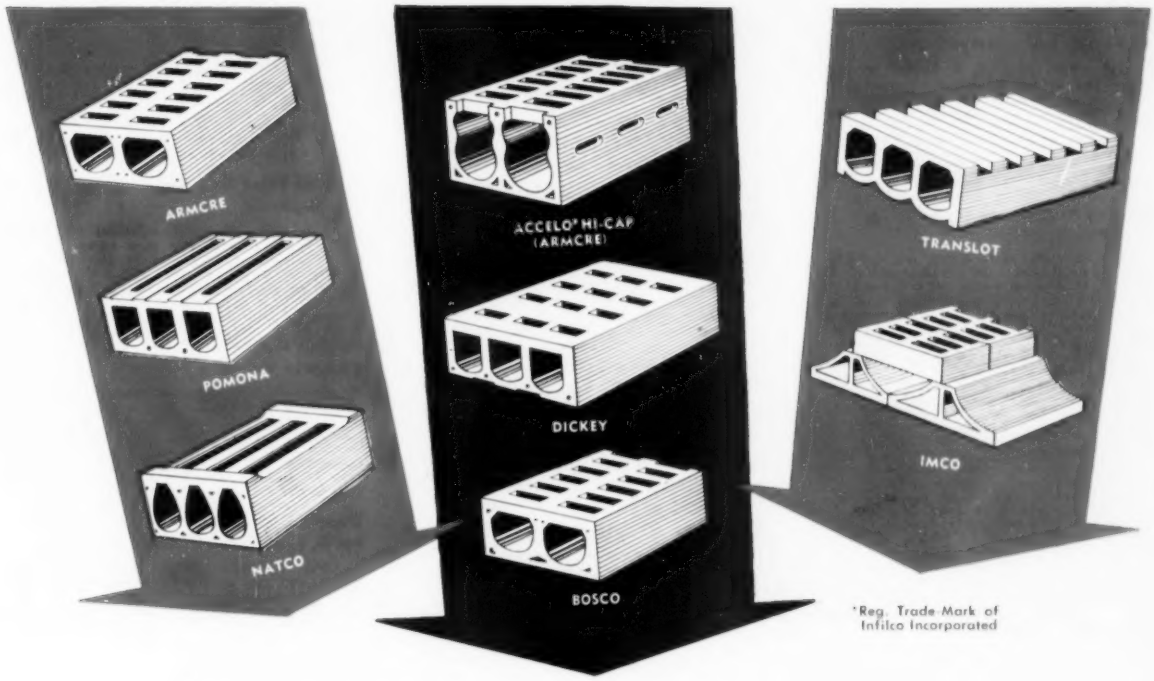

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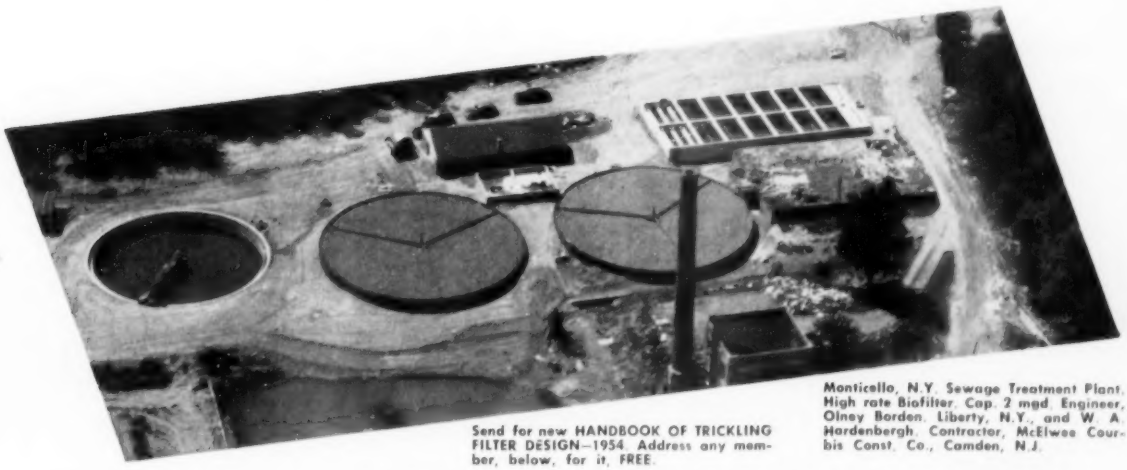

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To order these helpful booklets check the coupon on page 42.

Complete Catalog and Reference Data on Valves and Fittings

211. The entire M & H line of valves, fittings and accessories for water works, filtration, sewage disposal and fire protection are illustrated and fully detailed in Catalog 52 issued by M & H Valve & Fittings Co, Anniston, Ala. In addition to complete data on these products, there are many pages devoted to helpful engineering data. Every designer should have a copy. Get yours by checking the coupon

Are You Ready Now To Make Main Repairs?

214. Broken water mains can quickly be repaired when you have "Skinner-Seal" Split Coupling Clamps on hand. Get Skinner Catalog 41 now—this handsome 40-page book shows how to make every type of pipe repair and covers a complete line of clamps to do the job quickly and easily. Just check the handy coupon for your copy. M. B. Skinner & Co., So. Bend 21, Ind.

Water Conditioning Data Book Offered To Engineers

259. All engineers and municipal officials concerned with water conditioning will want a copy of the greatly enlarged edition of the popular Permutit Data Book prepared by the Permutit Co., 330 West 42nd St., New York 36, N. Y. This completely revised book presents a compilation of 78 tables, all valuable to the engineer. Subjects include hydraulics, impurities in water, reactions and conversions of chemicals used in water treatment, alkalinity relationships and other helpful material.

Technical Bulletin on Solenoid Operated Valves

288. Full technical data on applications, construction, dimensions and specifications of Golden-Anderson Cushioned solenoid operated valves is contained in Bulletin W-7, available from Golden-Anderson Valve Specialty Co., 1232 Ridge Ave., Pittsburgh, Pa. Selected valve patterns are offered in ½ to 2 in and 2½ to 36-in. sizes. Get all the details: just check the coupon.

Now Every Municipality Can Own a Trencher

173. The low cost of the Blackhawk Trench Hog, a tractor-mounted ladder type trencher makes it profitable for many municipalities to own their own trencher. Be sure to investigate this versatile machine which digs trenches to 8 feet deep, 20 inches wide. Illustrated bulletin available from Arps Corp., New Holstein, Wis. Just check the coupon.

Locate Mains and Services Without Digging

186. A 16-page booklet tells how to use the Fisher "M-Scope" to locate buried pipes and valves by electronic means. Proper manipulation also determines depth of cover. Battery operated unit is readily carried by one man. Get data from Fisher Research Laboratory, Inc., 1961 University Ave., Palo Alto, Calif.

Investigate This Compact Flow Meter for Water

226. The Foster "Flow Tube" is a metering element that is compact and easy to install. Bulletin FT illustrates simple element containing nozzles for differential pressure production and shows capacity range and accuracy. Made in standard type sizes. Foster Engineering Co., Union, N. J. will send copy, or use coupon.

All About Centrifugal Pumps

361. Where pumping performance counts you want to check your specifications carefully. Investigate the features of Fairbanks-Morse centrifugals. Use coupon or write to Fairbanks, Morse & Co., Dept. P. W., Chicago 5, Ill.

Helpful Data On Pipe Repairs

373. CircleSeal clamps for repair of breaks, leaks of corroded areas in all types of service pipe are described in bulletins issued by R. H. Baker & Co., 2070 E. Slauson Ave., Huntington Park, Calif. Check the coupon for your copy.

Helpful Data On Pipe Tools

230. Toledo drop head ratchet threaders are light, compact, ideally suited for work in tight corners. Three models for ⅛" to ¾"; ⅛" to 1¼"; and ½" to 2" pipe all feature quick change of sizes. Get Catalog 11a52 from Toledo Pipe Threading Machine Co., Toledo, Ohio. Check the coupon.

Helpful Valve Catalog For Engineers

236. For complete descriptions of Darling double disc, parallel seat gate valves be sure to get Bulletin 5002 issued by Darling Valve & Mfg. Co., Williamsport, Pa. Construction details covering all valve parts and accessories are helpful for specification writers. Check the coupon for your copy.

Helpful Data on Butterfly Valves

238. A comprehensive catalog which furnishes full data on the design and application of Pratt Rubber Seat Butterfly Valves has been made available to designers and engineers by Henry Pratt Co., 2222 So. Halsted St., Chicago 8, Ill. Check the coupon for your copy of this excellent source of practical information.

Standard Specifications for C. I. Pipe and Fittings

278. Standard dimensions for cast iron water pipe and special castings are available in a convenient booklet offered with the compliments of U. S. Pipe and Foundry Co., Birmingham 2, Ala. Get your copy by checking the coupon.

Job Data Offered on New Steel Water Mains

342. A 16-page illustrated report listing construction details on steel water lines is entitled "Dresser Coupled Steel Water Lines in the Year 1952." Get your copy from Dresser Mfg. Div., 59 Fisher Ave., Bradford, Pa. by checking the coupon.

AURORA, ILLINOIS *Also*
REDUCES SEWER MAINTENANCE COSTS WITH "*Flexibles*"

We believe Aurora's satisfaction with its new "Flexible" SeweRodeR can best be told from these excerpts from a letter written January 30, 1954.

"We received our SeweRodeR . . . on or about January 5, and would like at this time to advise that this machine has already reduced our sewer maintenance costs and we feel it will be a great advantage to our city to have it . . . we have found a lot more can be accomplished with the SeweRodeR each day and with less manpower. All the work is done from the street level by lowering the auger with a rope to the main. Would also like to compliment Mr. W. G. Weichel who demonstrated . . . and trained our men to operate it.

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Note: The "Flexible" SeweRodeR not only takes 9/10 of the usual hard work out of cleaning sewers . . . but permits preventative maintenance to be carried on without interference by weather.

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LOCATION: Between Lyford, Texas, reservoir and Willacy County Water Control and Improvement District No. 1

PIPE: Over 26,000 feet of 14" unreinforced concrete pipe in 4' lengths. Manufactured by the Valley Concrete Pipe Co., McAllen, Texas

COUPLINGS: TYLOX flexible rubber JOINTS

ENGINEERS: Sigler, Clark and Winston, Weslaco, Texas

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Making Joints with
TYLOX RUBBER GASKETS
Is as simple as
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Lubricate sliding surfaces with Tylox Cement.

Cement tongue and snap on Tylox gasket.

Shove the pipe home.

Lay pipe under the broiling summer sun in Texas — run cold water through the line — and you get serious leakage from the contracted joints. That was the problem facing the engineers on the Lyford, Texas, water supply line. And, they answered it with TYLOX, the flexible rubber joint that makes lines leakproof for life!

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You, too, can stop leakage, or infiltration, quickly, effectively and inexpensively with the positive, enduring seal of a TYLOX rubber joint. More than 200,000 miles of pipe and up to 60 years of known service life support your use of rubber couplings.

Solve that next, tough "pipeline problem" with TYLOX RUBBER JOINTS!

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"THE ONLY PERMANENTLY TIGHT LINES ARE LAID WITH RUBBER JOINTS"

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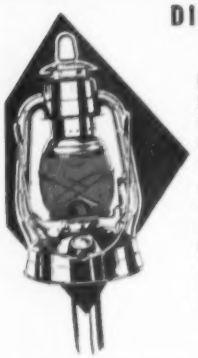

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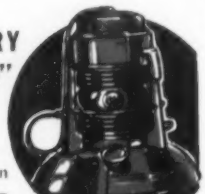

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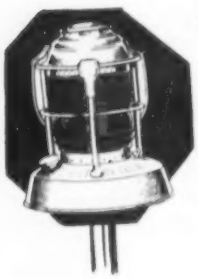

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How to Compute Quantities of Jointing Materials

271. A helpful table for determining quantities of "Tegul-Mineralead" required, using jute or "Hyde-Ro Rings", plus complete answers to your questions on sulfur compound jointing materials will be found in Bulletin M-10 issued by Atlas Mineral Products Co., Mertztown, Pa. Check the handy coupon today.

What You Should Know About Turbine Pumps

294. In a colorful bulletin titled "Water Where You Want It . . . When You Want It" the Johnston Pump Co., Bin "K", Pasadena 8, Calif., gives details on turbine pumps with both semi-open and closed impellers; oil or water lubrication; and adaptations for any power source or combination thereof. Get your copy of bulletin 1013 by checking the coupon.

Factors to Consider in Elevated Tank Selection

299. Details on the several different types of elevated steel tanks, including capacity ranges, tank dimensions and other factors to be considered in the selection of elevated tanks for modern water storage, plus discussions of new tanks for old towers and foundations are included in Bulletin 101 of the Pittsburgh-Des Moines Steel Co., Neville Island, Pittsburgh, Pa. Check coupon for your copy.

Cleaning Service for Every Type of Pipe Line

302. Flexible Pipe Cleaning Co., operating with specialized equipment and trained crews, is prepared to remove scale, rust and other deposits from pipes for every type of service. For details and estimates furnished without obligation write Flexible Pipe Cleaning Co., Box 167, Los Nietos, Calif. or check the coupon.

Convenient Data on Water Works Fittings

327. Complete data on water works brass goods and allied fittings, including curb stops, corporation stops and couplings, lead gooseneck, meter fittings, service boxes and drilling and tapping machines is furnished in convenient form by Hays Mfg. Co., Erie, Pa. Be sure you have this information in your files. Check the coupon.

How Your Filter Washing Can Be Improved

368. More effective sand washing with elimination of mud balls and bed cracking with resultant longer filter runs are claimed for the Palmer Filter Bed Agitator, described in bulletins issued by Palmer Filter Equipment Co., Erie, Pa. Get latest data by checking the coupon.

Boltless Tapping Sleeves Speed Installations

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What You Should Know About Concrete Culvert Construction

61. An excellent reference book published by the Portland Cement Association, 33 West Grand Ave., Chicago 10, Ill. presents a discussion of culverts and conduits from the viewpoint of the engineer who must design them. Fundamental considerations; practical methods by which economical drainage structures may be chosen, properly located and correctly designed; procedures which permit shortcut design without extended analysis; and illustrative examples are included in this helpful publication. Write to PCA or check the coupon for your copy.

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85. When the sides of patches and trenches are sawed before breaking, a saving of 25% in removal costs is claimed. And the smooth, straight edges won't spall or crack after replacement material is poured. Investigate the exclusive features that give maximum economy to Clipper concrete saws. Full information from Clipper Mfg. Co., 2823 S. Warwick, Kansas City 8, Mo., or check the handy coupon.

Grading Can Be Faster, Cheaper and Easier

96. You'll like every feature of the Austin-Western 99H Grader. It has all-wheel drive, all-wheel steer, controlled traction, precision sideshift and a high lift, extreme reach, reversible blade. Get data from Austin-Western Co., Aurora, Ill.

How to Save Time on Curb and Gutter Work

143. Every type of curb and gutter work is illustrated in the 12-page Heltzel catalog on steel forms for building concrete curbs, gutters and sidewalks. Time-saving setups show how to speed up the job and save money. Get your copy from Heltzel Steel Form & Iron Co., Dept. PW, Warren, Ohio.

Black-Top Paver Offers Many Advantages

150. The flexible Adnun Black Top Paver lays any asphalt mix, hot or cold, in widths from 6 ft. to 13 ft. Careful design lowers operating cost and cuts maintenance. Attachments spread stone, cinders or slag. Get full data on this machine by checking coupon. The Foote Co., 1954 State St., Nunda, N. Y.

Better Highways Through Salt-Soil Stabilization

162. Practical information for the men who build, repair and maintain our highways is provided in two bulletins issued by the International Salt Co., Inc., Scranton, Pa. General principles of salt-soil stabilization, applications, plant mix and road mix are described. Check the coupon for your copies.

Speed Concrete Removal And Make Better Patches

202. Felker self-propelled concrete cutters saw to 6½" depths to facilitate concrete removal and produce smooth, straight edges which resist spalling when patched. Full data on cutters and segmented type diamond abrasive wheels are available from Felker Mfg. Co., Torrance, Calif. Check the coupon today!

How To Build Stabilized Heavy Traffic Pavements

233. A 16-page booklet published by Seaman Motors, Inc., Milwaukee, Wis., shows how low cost, local materials may be utilized in the construction of heavy duty pavements. Many illustrations and well-written text give full instructions on materials and construction methods for subgrades, subbases and base courses. A worth-while booklet for every highway engineer. Check coupon for copy.

Structural Details of Concrete Bridge Design

279. A 48-page booklet entitled "Concrete Bridge Details", available from the Portland Cement Association, 33 West Grand Ave., Chicago 22, Ill., focuses attention on structural design details where improvement is most often needed. Generously illustrated, this booklet shows design features of abutment footings, breatwalls, wingwalls and bridge seats; joints for abutments and decks; and many other elements in bridge construction. Check the coupon for a copy.

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Provides BIG SAVINGS For These CITIES

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Portable Melting Furnace For Rubberized Joint Sealers

213. The Hauck double jacketed melting furnace uses L-P gas as fuel and a high flash point oil for heat transfer to assure close temperature control when melting rubberized joint sealers of all types. All details on this 16-gallon capacity unit are furnished in Bulletin 1081. Check coupon for your copy. Hauck Mfg. Co., 124 10th St., Brooklyn 15, N. Y.

Give Full Protection To Treated Poles and Timbers

267. Bolt holes in treated poles and timbers used for guard rails and structures can easily be the first point of decay. Now you can assure maximum life by using the Greenlee Bolt Hole Treater, a simple device that forces preservative into the wood cells. Bulletin 13-15 gives the details. Greenlee Bros. & Co., Rockford, Ill.

Patching and Maintenance With Bitumuls

283. Proper maintenance of paved surfaces is the subject of an informative 24-page booklet "Bitumuls for Maintenance" published by American Bitumuls & Asphalt Co., 200 Bush St., San Francisco 4, Calif. Profusely illustrated and well-written, this text gives step-by-step descriptions of patching and other surface maintenance operations. Check the coupon now to order your copy.

Hydraulic Mower Cuts Costs as Well as Grass

372. Simple, conveniently located controls, smooth cutting action and easy maintenance add up to more mowing per day with the Anderson hydraulic mower. Available for mounting on most leading makes of tractors. Get full data from A. C. Anderson, Inc., Wildwood, N. J., by checking the coupon.

Think of Aerial Surveys When You Need Maps

311. Every engineer and public official should investigate aerial surveys for maps of new areas, up-to-the-minute maps for city planning, highway relocation, surveys to plan extensions of sewers, water mains and utilities. Precise contours for topographic maps and other data in any detail desired can be furnished by Aero Service Corp., 236 Courtland St., Philadelphia 20, Pa. Interesting booklet on aerial mapping services and methods available by checking the coupon.

Use Hot Patch Material On All Maintenance Jobs

297. With the Barber-Greene Mixall you can get hot patch material wherever and whenever you need it for all maintenance jobs. Send for new 8-page bulletin that gives full information on this small, highly portable unit that turns out all types of bituminous patch material in any quantity you need. Write Barber Greene Co., Aurora, Ill., or use the coupon.

Versatile Road Wideners Improve Highways at Low Cost

374. In illustrated bulletins describing Apsco road wideners and base pavers you will find full data on two versatile pieces of road building equipment that will help you hold down costs while bringing old roads up to present day standards. Get the full story today by checking the coupon, or write to Blaw-Knox Equipment Div., Blaw-Knox Co., Pittsburgh, 38, Pa.

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STREET LIGHTING

Helpful Data On Outdoor Lighting Equipment

63. A complete catalog of standard Union Metal brackets, mast arms and accessory attachments for poles of every type, and including mounting instructions and illustrated construction details is now available from Union Metal Mfg. Co., Canton 5, Ohio. Get this important reference booklet by writing to the company, or check the coupon.

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366. You can get complete data on Kerrigan factory-built "Weldforged" street lighting standards by using the handy coupon. Check these strong, well designed, yet inexpensive steel standards for practical street and highway lighting. Handsome folder also includes data sheets on floodlighting and area lighting standards. Kerrigan Iron Works, 1033 Herman St., Nashville, Tenn.

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SEWERAGE AND WASTE TREATMENT

What You Should Know About Trickling Filter Underdrains

20. Specifications for vitrified clay underdrain blocks conforming to ASTM standards, suggestions for layout and construction of trickling filter floors, dimensions of standard blocks, channel covers, angles and other fittings are available from the Trickling Filter Floor Institute c/o Editor, Public Works, 310 E. 45th St., New York 17, N. Y. Check the coupon and we will forward your request.

Efficient Blowers for Activated Sludge Plants

232. Many advantages of Roots-Connersville positive displacement rotary blowers are described in Bulletin 22-23-B-13, which also provides characteristic curves for operation with constant speed, multi-speed and variable speed motors and details of several types of blowers. Get this helpful bulletin by checking the coupon. Roots-Connersville Blower Corp., Connersville, Ind.

Book Tells How to Control Root Stoppages

249. Details on the proven use of copper sulfate to control root and fungous growths in sewers are contained in a brand-new book published by Phelps Dodge Refining Co., 40 Wall St., New York 5, N. Y.

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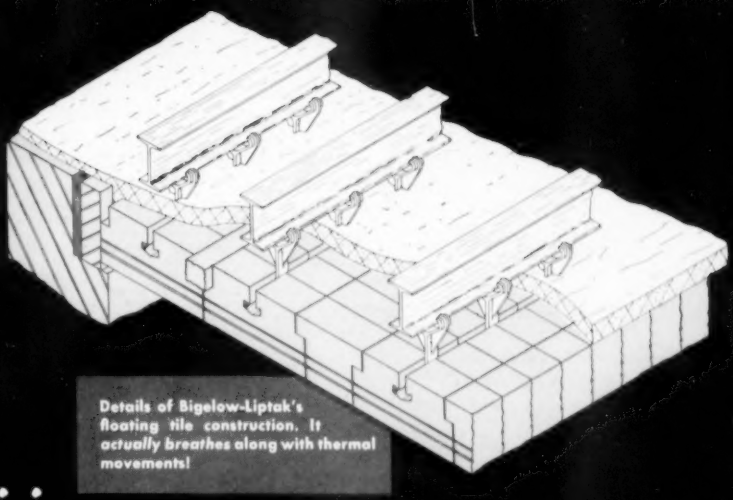
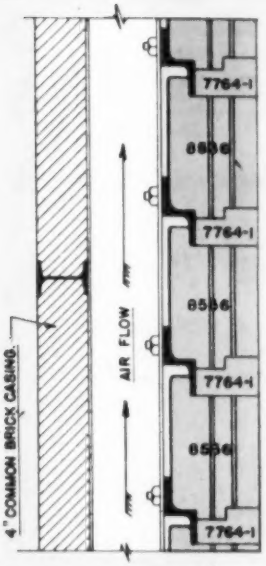


Details of Bigelow-Liptak's floating tile construction. It *actually breathes* along with thermal movements!



Cross section of B-L's arch construction. Note how heavy, heat-resisting castings support the tile.

City planning engineers and consultants will be vitally interested in the fact that Bigelow-Liptak's unique, unit-suspended design for furnace walls and arches makes incinerators "tougher than blazes" too.

Proof of that fact lies in the many B-L installations which dot the country. Right now, in suburban Detroit, Michigan, construction is underway on a large incinerator which features the B-L design.

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1. Each tile is individually supported—there's no "stacked up" burden caused by the ones above it. Thermal expansion is confined to individual tile. Mechanical spalling caused by pinching, buckling, etc. is eliminated. That adds up to no cumulative loading or expansion.
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Remember: you'll pay less in the long run. Countless installations in boiler houses, oil refineries, metallurgical furnaces—wherever heat must be controlled—have proven that fact. Write for information—today.

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How Cities Clean Sewer Lines From Street in One Operation

25. In a helpful 28-page handbook of sewer cleaning methods and equipment the makers of OK Champion sewer cleaners give full details of power and hand operated models. Also included are data on expansion buckets that take dirt from sewer to street in one operation, root cutters and other accessories. Get your copy by checking coupon. Champion Corp., 4752 Sheffield Ave., Hammond, Ind.

How to Make Better Sewer Pipe Joints

37. How to make a better sewer pipe joint of cement—tight, minimizing root intrusion, better alignment of joint. Permits making joints in water-bearing trenches. General instructions issued by L. A. Weston Co., Dept. P.W., Adams, Mass.

Complete Catalog for Engineers Shows Water and Sewage Plant Equipment

191. The complete line of Jeffrey equipment for treatment of water, sewage and industrial wastes is covered in 52-page Catalog 833. Detailed information is provided on bar screens, grinders, grit collectors, "Jigrit" washers, sludge collectors, feeders, conveyors this valuable booklet. Use coupon or write and other related units. Photos and drawings of installations plus capacity tables complete Jeffrey Mfg. Co., 947 N. 4th St., Columbus 16, Ohio.

How Tunnelliners Revolutionize Underground Sewer Construction

205. The Tunnelliner method of underground sewer construction places full-ring sections of pre-cast, oval shape reinforced concrete pipe as excavation progresses, thus providing a full-strength structure right up to the working face. Available in 33" through 72" sizes, the job is done with equipment which may be rented at a nominal charge. You can get full information on this method by writing Lamar Pipe and Tile Co., Grand Rapids 9, Mich., or by checking the coupon.

Complete Sanitation and Process Equipment Bulletin

40. A complete illustrated bulletin gives detailed information on all "Rex" sanitation and process equipment. 36 pages of engineering data, process descriptions, conversion factors. Get Bulletin 51-83 by checking the coupon. Chain Belt Co., Box 2022, Milwaukee 1, Wis.

A Handbook of Sewer Cleaning Methods and Materials

44. Complete, easy-to-follow directions for every type of sewer cleaning operations and the equipment needed for effective cleaning work is covered in a 40-page booklet issued by Flexible Sales Corp., 3786 Durango, Los Angeles 34, Calif. Full details are provided on power cleaning machines, the SeweRodeR, hand tools and all accessories. Water main and culvert cleaning methods are included. Check the coupon for your copy of this helpful handbook.

Helpful Design Data For Sewage Ejectors

81. The applications and advantages of pneumatic sewage ejectors are outlined in a new bulletin of the Blackburn Smith Mfg. Co., Inc., Hoboken, N. J. Included are piping diagrams for electrode and float switch controls plus dimensions and layouts for single and duplex systems. Get your copy by checking coupon.

A Short Course In Pipe Jointing

159. The story of rubber couplings for clay and concrete pipelines is graphically presented in the booklet "Pipe Enterprise", published by Hamilton Kent Mfg. Co., Kent, Ohio. Detailed description of pipe jointing methods; photos showing jobs where Tylox gaskets met the need for easily assembled, permanently tight joints installed under all conditions; and a report on the development, manufacture and outstanding features of the compression type gasket make this booklet valuable to every engineer and contractor. Check the coupon for free copy.

Theory of Controlled Digestion With Floating Cover Tanks

88. In an excellent 40-page booklet, an authoritative discussion of digestion theory and practices, including design, operation and economics is presented by the Pacific Flush Tank Co., Chicago 13, Ill. Complete data are given on the use of floating covers, together with details on tank construction, piping and control chambers. Requests for this valuable booklet must be made on business letterhead.

Floatless Liquid Level Controls

92. Complete descriptions of electrode type floatless liquid level control systems, including control units, electrodes and fittings, panel assemblies and diagrams of typical installations for all types of municipal service are covered in the 32-page catalog of Charles F. Warrick Co., 1956 W. Eleven Mile Rd., Berkley, Mich. Check coupon for your copy

Comminutors for Automatic Disposal of Coarse Sewage Solids

152. The problems connected with disposal of coarse sewage solids are eliminated by clean, odorless, automatic Comminutors. Full engineering data show the proper model for every size plant and furnish details of hydraulics and typical installations. Chicago Pump Co., 622 Diversey Pkwy., Chicago 14, Ill

Non-Clogging Vertical Wet-Pit Pump Described

182. Full engineering data on Worthington "Freeflo" wet-pit pumps with non-clogging impellers capable of passing solids and stringy material are included in Bulletin W-317-B12. Check these pumps for sump, sewage and drainage service. Bulletin available from Worthington Corp., Harrison, N. J. Just use the coupon.

Helpful Data on Venturi Type Meters

221. The Simplex type MO Meter for measurement of water, sewage, sludge and industrial liquor flows over wide ranges, is

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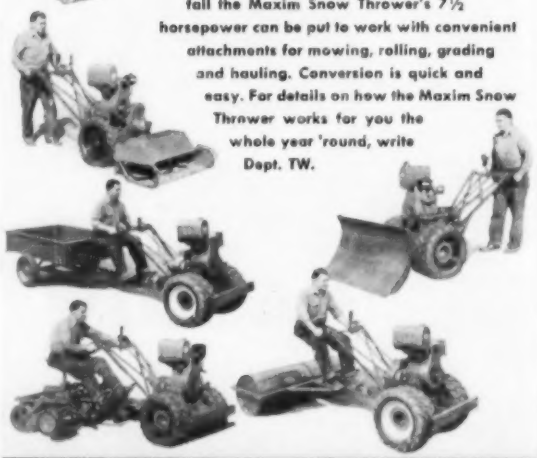

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On all chemicals always follow directions for application. Where warning or caution statements on use of the product are given, read them carefully.

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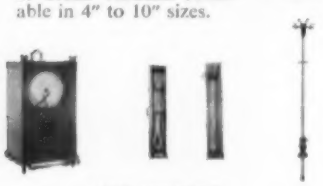

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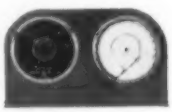

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Reference Book on Lubricated Plug Valves

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35. At today's prices, hand digging means the job will be costly. You can dig through asphalt and macadam, work fast and efficiently even in cramped areas with the tractor mounted Sherman Power Digger. From one position you can reach to dig 10 feet behind tractor in 140° arc and to depth of 8 feet. For full details check the coupon. Sherman Products, Inc., Royal Oak, Mich.

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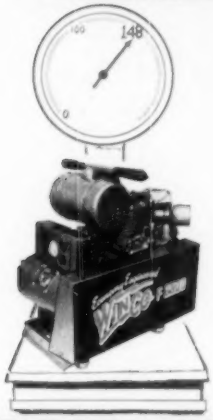

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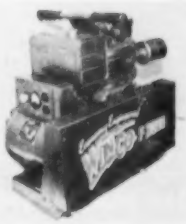

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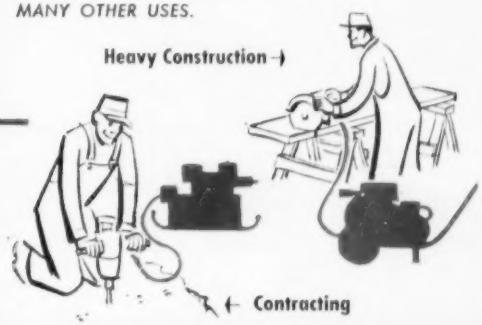

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Inexpensive Ditcher Handles Heavy Digging

91. The Shawnee Scout Ditcher, a new, heavier model for extensive digging has been added to the Shawnee line of ditchers and dozers. All models are designed to handle ditching and backfilling operations quickly, efficiently and at low cost. Full information on this equipment will be sent by Shawnee Mfg. Co., 1947 N. Topeka, Topeka, Kansas. Just check the coupon.

8 Reasons Why You Should Check the Jaeger Loader

207. In a profusely illustrated 16-page catalog devoted to the applications and special design features of the Jaeger "Load-Plus" tractor-loader unit, eight good reasons listed to back up the claim that this machine outproduces any other loader of its size. These include load capacity, balance, reach, maneuverability, automatic power adjustment by torque converter, instant reversal, multiple speed and ease of control. Check them all by getting a copy of Catalog L100-3. Check the coupon today. Jaeger Machine Co., 400 Dublin Ave., Columbus 15, Ohio.

How Air Placement of Concrete Will Help on Your Jobs

215. There are hundreds of jobs that can be done easier and cheaper by air placement of concrete; reservoir, tank and pool linings, concrete maintenance of all sorts are just a few of the applications. Get full details on two models of the high speed, easily operated "Bond actor" from Air Placement Equipment Co. 1009 West 24th St., Kansas City 8, Mo. Check the coupon.

Safety Lantern With Pencil Beam Signal

70. Get information on the Dietz "Night Watch" Safety Lantern with special globe design that saves fuel by intensifying light rays into a pencil beam. Full details available from R. E. Dietz Co., Syracuse, N. Y. Just check the coupon for full data.

Excavating Machines Engineered for Performance

119. A complete line of excavating and materials handling machines in 10 to 60 ton—¼ to 2½ cu. yd. capacities are offered by Osgood-General, Marion, Ohio. Several bulletins give details on special features that increase efficiency and reduce maintenance. Check the coupon for full information.

Three-Wheel Roller For General Purpose Duty

142. A 20-page bulletin describing general purpose 3-wheel rollers covers 8, 10, 12 and 14-ton gasoline and diesel models of the Huber line. Illustrations and comprehensive explanation show component parts of the rollers and describe the general duties of the units. For your copy of this attractive bulletin, No. H-150, write the Huber Mfg. Co., Marion, Ohio, or use the coupon.

Details on Motor Grader Construction and Use

312. In a handsome catalog, profusely illustrated with diagrams and photographs of unusually fine quality, the Galion Iron Works and Mfg. Co., Galion, Ohio, has presented all details on the construction and operating features of their Model 118 motor grader. This impressive 28-page catalog, No. 375, is available without charge. Just check the coupon.

Trencher Fits Municipal Needs

315. A bulletin describing the Cleveland Model 95 trencher has been published by the Cleveland Trencher Co., Cleveland 17, Ohio. The Model 95, called "The standard machine for city and suburban work", is versatile, manueverable and economical for use on water lines, service lines, road widening and all utilities trenching. Get this 8-page illustrated bulletin by checking the coupon.

Get Data on the Tractair, A "10 in 1" Machine

319. You will hold down your investment in special equipment and be ready to do 10 basic jobs on maintenance and new construction when you own a Le Roi "Tractair", the versatile combination of a 35-hp wheel tractor and 105 cfm air compressor. Be sure to investigate the unlimited usefulness of this machine. Get full data from the Le Roi Co., Milwaukee 14, Wis., or check the coupon.

Get Tough Blades and Cutting Edges For Your Construction Equipment

326. Controlled analysis steels used in Shunk blades and cutting edges for graders, scrapers, dozers, and snow plows means long life and wear resistance to give you more value from your maintenance dollar. Full data for ordering blades and scarifier teeth for standard and special equipment is available from Shunk Mfg. Co., Bucyrus, Ohio. Check the coupon today.

How the "Payloader" Helps Public Officials

190. An attractive new booklet "Getting More for the Tax Dollar with Payloaders" makes worthwhile reading for every public official in charge of construction and maintenance of roads, streets, and utilities. You will find illustrations and data showing dozens of ways the "Payloader" is used by cities, counties and states, plus convenient specifications on seven models. Check the coupon or write Frank G. Hough Co., 761 Seventh St., Libertyville, Ill.

Design Data on Universal Concrete Cribbing

274. Complete information on concrete cribbing for embankment retaining walls, bridge abutments, highway underpasses and other structures will be found in a new bulletin issued by the Universal Concrete Pipe Co., 297 S. High St., Columbus, Ohio. Check coupon for free copy.

ROAD MAINTENANCE EFFICIENCY IS YOURS *with a . . .*

Just trail this 101 Utility Spray Tank behind a maintenance truck and you'll be surprised the road work you can do in a single day. The 101 will handle small application jobs, hand spray patch work, fill pouring pots for patch and crack filling work. It's Utility plus—and the 101 will handle Asphalt, Tar, Emulsions, Road Oils, and Cut-Back and there's a size for every job, made in two wheel trailer models 400 and 600 gal. truck mounted 600, to 1000 gal. and 4 wheel trailer 600 to 1250 gal. For fast, efficient road maintenance work the 101 has no equal.

Purchase the equipment with the Littleford "Built in Engineering" seal and be sure its Engineered for the job.

Equipment with BUILT-IN ENGINEERING LITTLEFORD

LB LITTLEFORD

LITTLEFORD BROS., INC.
452 E. Pearl St., Cincinnati 2, Ohio

VERSATILITY is the keynote in SHAWNEE EQUIPMENT

HYDRO-CLAM CONVERTS TO BACKHOE SIMPLY BY CHANGING BUCKET BOOMS

Ideal for large and small operators—Municipalities and Counties.

AVAILABLE FOR MOST ALL TRACTORS—One machine . . . convertible to perform two types of digging! This practical feature was first requested by owners of Shawnee equipment—Now it is fulfilled. It means greater economy and increased versatility—from digging long trenches 10" to 20" wide the machine can be converted to the clam for spot excavations (36-in. minimum) in just a few minutes time.

HYDRO-CLAM AS BACKHOE

HYDRO-CLAM WITH CLAM

Write for specifications and name of your dealer.

SHAWNEE Scout

SHAWNEE Manufacturing Co., Inc.
1947-L N. TOPEKA TOPEKA, KANSAS

Now's the time to mail this month's Reader's Service card.

Mono-Cast Roll-On Joint Pipe For Permanence!

AMERICAN Mono-Cast Roll-On Joint pipe is growing rapidly in popularity. This type of pipe is offered as an alternate for standard Mono-Cast Bell and Spigot pipe with lead and jute joints, and has gained wide acceptance within a comparatively short period of fifteen years. Roll-On Joint is included in new Federal Specification WW-P-00421 as Joint Type II. Users of this type of cast iron pipe are enthusiastic about it.

Roll-On Joint pipe, in sizes 2″ through 48″, is cast centrifugally by the Mono-Cast process in nominal 16-foot lengths. Standard joint materials, including rubber ring, jute and bituminous joint compound are furnished with the pipe. Having a positive rubber packed bottle-tight joint, Roll-On is lower in first cost than other types of joints.

Pipe with the Roll-On Joints is easily and quickly assembled by unskilled labor. After assembly the joints will deflect easily and yet remain bottle-tight under pressure.

AMERICAN works hand-in-hand with engineers, contractors, and superintendents in solving piping problems in their respective fields. Our unexcelled foundry facilities and highly trained and experienced organization prove exceedingly helpful in connection with pipe installations. Consulting with us will not impose an obligation.

Roll-On Joint pipe will be featured in our booths 101 and 102 at the American Water Works Association conference in Seattle, Washington May 23-28. You are cordially invited to visit our exhibit.

Write for Roll-On Joint pipe literature, using coupon below.

AMERICAN CAST IRON PIPE COMPANY

BIRMINGHAM 2, ALABAMA

MAIL COUPON FOR LITERATURE

American Cast Iron Pipe Company,
Birmingham 2, Alabama

Gentlemen: Please send me a free copy of your new illustrated Roll-On Joint pipe literature.

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Thousands use our Readers' Service card to keep up to date . . . do you?

To order these helpful booklets check the coupon on page 42.

Booklet Helps Design of Custom-Engineered Steel Buildings

110. Custom-engineered Butler steel buildings are available in every size, type and design to meet your building needs. In a helpful 32-page booklet you will find details on several basic designs and an unlimited variety of door, window and interior treatments; answers to your questions on construction and erection; and many illustrations of typical uses. Use the coupon or write to Butler Mfg. Co., Kansas City, Mo.

●

CIVIL DEFENSE

Get the Facts on Air Raid Sirens

86. There's more to be considered in an raid warning sirens than the loudness of the signal. Get complete information on efficient size and spacing of sirens from Federal Sign and Signal Corp., 8733 So. State St., Chicago, Ill., by using coupon.

●

REFUSE COLLECTION AND DISPOSAL

Sanitary Landfill Operation and Methods

28. The location and area requirements for sanitary landfill, operation methods for trench type and area fills, equipment selection and costs are items discussed in an 8-page booklet issued by Allis-Chalmers Mfg. Co., Milwaukee 1, Wis. Be sure you have this reference when considering the problem of garbage and refuse disposal. Check the handy coupon today.

Increasing the Efficiency of Bulk Rubbish Collection

177. Strategically spotted bulk containers can be handled by one man operating a Dempster-Dumpster equipped truck. Get full details of this cost-saving system of rubbish collection, as used by many cities to increase efficiency and eliminate unsanitary conditions. Write Dempster Brothers, Inc., 952 Dempster Bldg., Knoxville 17, Tenn., or use the handy coupon.

Thinking of Sanitary Landfills? Get This Booklet Now

131 One of the most informative descriptions of the sanitary landfill method of garbage and refuse disposal is presented in Caterpillar's 16-page booklet "A Look to the Future with Sanitary Landfill." The booklet is designed to serve as a guide to proper site selections, the choice of the right equipment to do the job, and the actual operations of sanitary fill. Pictorial treatment shows how and when to start such a program, what to look for in a site, benefits received by the community, and other important considerations. Published by the Caterpillar Tractor Co., Peoria 8, Ill. Check the coupon for your copy.

Get New Data on Garbage Cookers for Hog Feed

287. Data on two types of garbage cooking equipment is now available from Littleford Bros., Inc., 457 E. Pearl St., Cincinnati 2, Ohio. Steam generators, both portable and stationary, are described in Bulletin MP-51; oil fired cooking kettles with special agitator and large discharge door, trailer or skid mounted is covered in Bulletin MP-50. Check the coupon now.

How to Construct A Sanitary Fill

331. A new 12-page booklet which tells the most efficient method of sanitary fill construction and furnishes complete information on planning and operation is now available from Drott Mfg. Corp., Milwaukee 8, Wis. Get your copy by checking the coupon; you'll find this booklet both interesting and valuable.

What You Should Know About Refuse Incinerators

362. Two helpful bulletins tell what you should know about low cost refuse incineration for the small community and for larger cities. Your questions on mechanical stoking, burning rates and operating problems are discussed. Get Bulletins 217 and 223 from Nichols Engineering & Research Corp., 70 Pine St., New York 5, N. Y. Just check the coupon.

Efficient Landfill Operations For Small Communities

349. Step-by-step photos and concise text are used in a bulletin of the Oliver Corp., to show the construction and operation of a sanitary landfill, using equipment especially suitable for the smaller community, the Oliver OC-3 Tractor-Loader. Besides providing economical refuse disposal, many other jobs handled by this unit are suggested. For a copy, write to the Oliver Corp., 400 W. Madison St., Chicago 6, Ill. or check the coupon.

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TRAFFIC SIGNS

How Reflective Sheeting Improves Traffic Signs

157. Get full data on Grotelite reflective sheeting for smooth, brilliant, long-life traffic signs and marking devices from the Grote Mfg. Co., Bellevue, Ky. Use the handy card or coupon today.

New Reflectorized Sign Faces Refurbish Old Traffic Signs

292. Get complete details on new "EZ-On" traffic signs faces ready for immediate shipments. Reflectorized faces cost only a fraction as much as new signs and are easily attached to existing traffic signs. Use the coupon for data today. Grace Sign & Mfg. Co., St. Louis 18, Mo.

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- Pump Controls
- Duplex Pump Alternators
- High and Low Level Cutoffs
- High and Low Level Alarms
- Multi-level Signals
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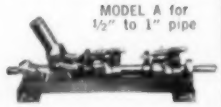
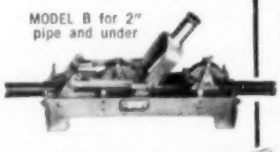
Warrick FLOATLESS LIQUID LEVEL CONTROLS ELECTRODE TYPE

Trojan Pipe Puller & Pusher

installs or renews pipe under pavement *in half the time* required by any other machine!





Exclusive continuous action, which eliminates all resetting of grip, does the trick!

The Trojan combines pushing and pulling operations in one machine —keeps pipe continuously moving —lets you install 40' services in as little as 20 min.

Model A needs only 5' trench. One man can easily install the average service. 15 tons of pushing pressure possible.

Model B is reversible in 30 seconds—has 3 speeds for different soils. New dog with individual inserts cuts maintenance.

Write today for full details!

The TROJAN Manufacturing Co.

1114 Race Drive · Troy, Ohio

HERE'S YOUR SOLUTION

Every grit problem is *different.* Velocities, head loss, hydraulic characteristics of chambers, capacities, grit size and type, and site conditions—all these factors must be considered in designing efficient grit chambers and collector equipment. There is no one standard answer...no one standard design that can be applied to all problems.

That's why so many engineers rely on Chain Belt Company for the answer to their grit-handling problems. For Chain Belt need not rely on a single standard solution. Each application is carefully studied, and from our background of more than 17 years of experience, we recommend the type and size chamber and equipment you need for most efficient results. In the complete range of sizes and types of Rex® Grit Collectors, there is a basic type that can be best adapted to your individual needs...the one best combination of units that will assure maximum results at lowest over-all cost.

So, whether your plant is large or small, do as so many satisfied users have done, take your problem to Chain Belt.

Take Advantage of These Rex Advantages

Rugged Design...designed and built to withstand the corrosive and abrasive operating conditions ... to handle heaviest loads.

Flexibility of Application...grit channels are designed for each specific application...widest selection of types and equipment to fit any range of channel sizes.

Effective Grit Recirculation... material with excessive organics or improperly separated materials can be recirculated through the channel for resettling. The Rex recirculation feature is rapidly being adopted by others...sure proof that adequate grit conditioning is accomplished by recirculation.

Neat Appearance...head shaft housing completely enclosed. Factory sub-assemblies assure proper field alignment and fit... cut costs and increase equipment life.

For help with your problem, see your nearest Rex Sanitation Engineer or write Chain Belt Company, 4722 West Greenfield Avenue, Milwaukee 1, Wisconsin.

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District Sales Offices in all principal cities

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It's a fact... our handy Readers' Service card is the way to get new catalogs.

Dual electrical system assures reliable power at Elm Fork

Completion of the Elm Fork Water Purification Plant represents a major stride in the water works expansion program at Dallas, Texas. Costing eight million dollars, this outstanding installation doubles the city's purified water supply. It boosts total plant capacity to 200-mgd.

Reliable electrical service at Elm Fork is assured by a secondary selective radial distribution system—adapted by Dallas' engineers, in collaboration with the consulting engineers and Westinghouse. Duplicate primary feeders, bus, transformers and switching equipment are provided. Thus, should a feeder or transformer fault occur, service is restored quickly to all loads.

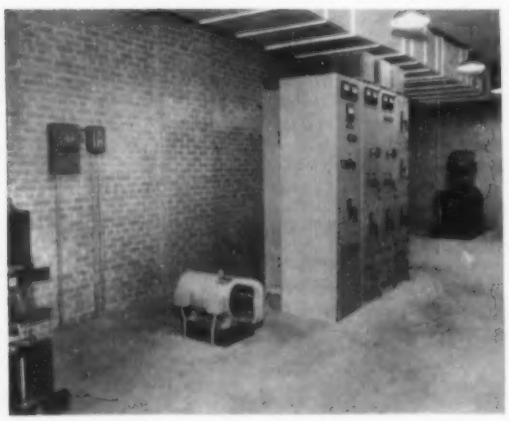
Compact and unitized Westinghouse equipment was chosen for the Elm Fork system. It conserves building space . . . simplifies maintenance due to accessibility of breakers . . . can be expanded easily as loads grow.

You can profit from this same kind of assistance. Whether the program calls for expansion or modernization, Westinghouse engineers are ready to help you and your engineers adapt a distribution system . . . and match it with a complete line of co-ordinated equipment.

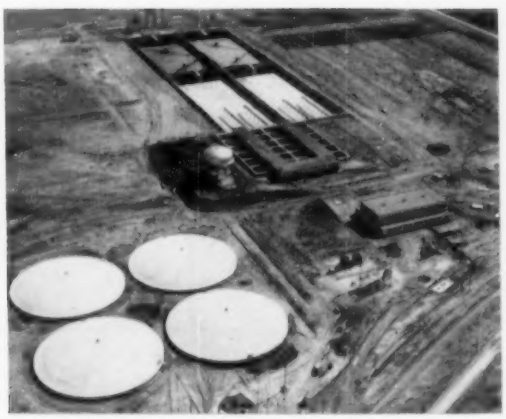
For full details call the Construction Application Engineer at your local Westinghouse Office. Or write direct to Westinghouse Electric Corp., P. O. Box 868, Pittsburgh 30, Pa.

J-94993

YOU CAN BE SURE...IF IT'S Westinghouse



Westinghouse Battery Charger Board controls motor-generator sets which charge batteries. These supply d-c power to the swichboard relays as well as other devices in the Elm Fork electrical distribution system.

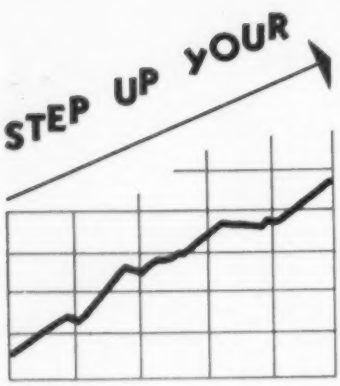


Elm Fork Water Purification Plant doubles the Dallas, Texas water supply. Along with new mains, added recently, it can be expanded easily in the future. Consulting engineers for the project: Myers & Noyes.

Get full details of this month's products . . . mail your Readers' Service card today.

Westinghouse Metal-Clad Switchgear is mounted in a single line, over 100 feet long. This permits maintenance of circuit breakers and transfer of loads from front of switchboard, without power loss at any point.

Now's the time to mail this month's Reader's Service card.



filter performance with PALMER FILTER BED AGITATORS

The Palmer Filter Bed Agitator is a simple and inexpensive device that is being incorporated in new and existing plants to increase the filtration capacity and eliminate mud balls.

TECHNICAL ADVANTAGES

- 1—Requires an average of 40% less wash water
- 2—Completely eliminates mud balls
- 3—Eliminates cracking or shrinking of the beds
- 4—Produces "new" filter media after short period of normal operation
- 5—Turns out purer, better tasting water
- 6—Low installation cost
- 7—Low operating cost
- 8—More water through the filters
- 9—Less "time out" washing filters

The Palmer Filter Bed Agitator is covered by U. S. Patents 2309166 and 2309017.

ENGINEERING FACTS

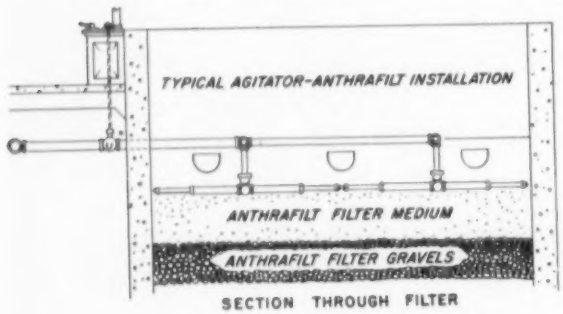
CONSTRUCTION—The Palmer Filter Bed Agitator is constructed of brass and bronze throughout. Nozzles can be removed easily from the agitator arm.

SIZES—Palmer Agitators are adaptable to any size or type of filter. Available in lengths up to 15'.

WATER REQUIRED—The Palmer Agitator operates with low volume at high velocity. Usually, a delivery of ½ g.p.m. per square foot of filter bed is ample.

PRESSURE REQUIRED—40 lbs. and upwards. R.P.M.—The speed of the Agitator varies from seven to eighteen r.p.m.

SIMPLICITY—Simple to install, easily observed and inspected.



SECTION THROUGH FILTER

The Palmer Agitator consists of a horizontal bronze arm suspended just above the surface of the Anthrafilt or sand. The agitator arm contains jet nozzles through which water is forced at extremely high velocity. The jets are pointed downward to penetrate the filter media before the wash water is turned on. This penetration breaks up the surface of the filter bed while the agitator revolves slowly, propelled by the velocity of the water through the jets. Thus, the media is in a fluid condition and free from encrusted deposits when the wash water is turned on. When the wash water reaches the level of the agitator arm, the tremendous velocity of the jets causes violent turbulance while the upper strata of the sand or Anthrafilt is expanded. The Palmer Agitator remains in action until shortly before stopping the filter wash.

IMPROVE FILTRATION . . . EFFECT ECONOMIES WITH . . .

Anthrafilt

(Trade Mark Reg. U. S. Pat Off.)

Anthrafilt is SELECTED Pennsylvania anthracite, crushed, cleaned, screened and graded to required sizes. It increases the length of filter runs. Requires half the backwash water used for sand; reduces algae troubles to a minimum; is insoluble in acids or alkalies; permits higher filter rates and increases average plant capacity 50%; and there is less coating with inorganic salts. The cost of Anthrafilt is low. We invite technical enquiries.

OVER 200 UNITS IN OPERATION

Ask any user. Write us for list of installations and for descriptive bulletins.

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FILTER EQUIPMENT Company

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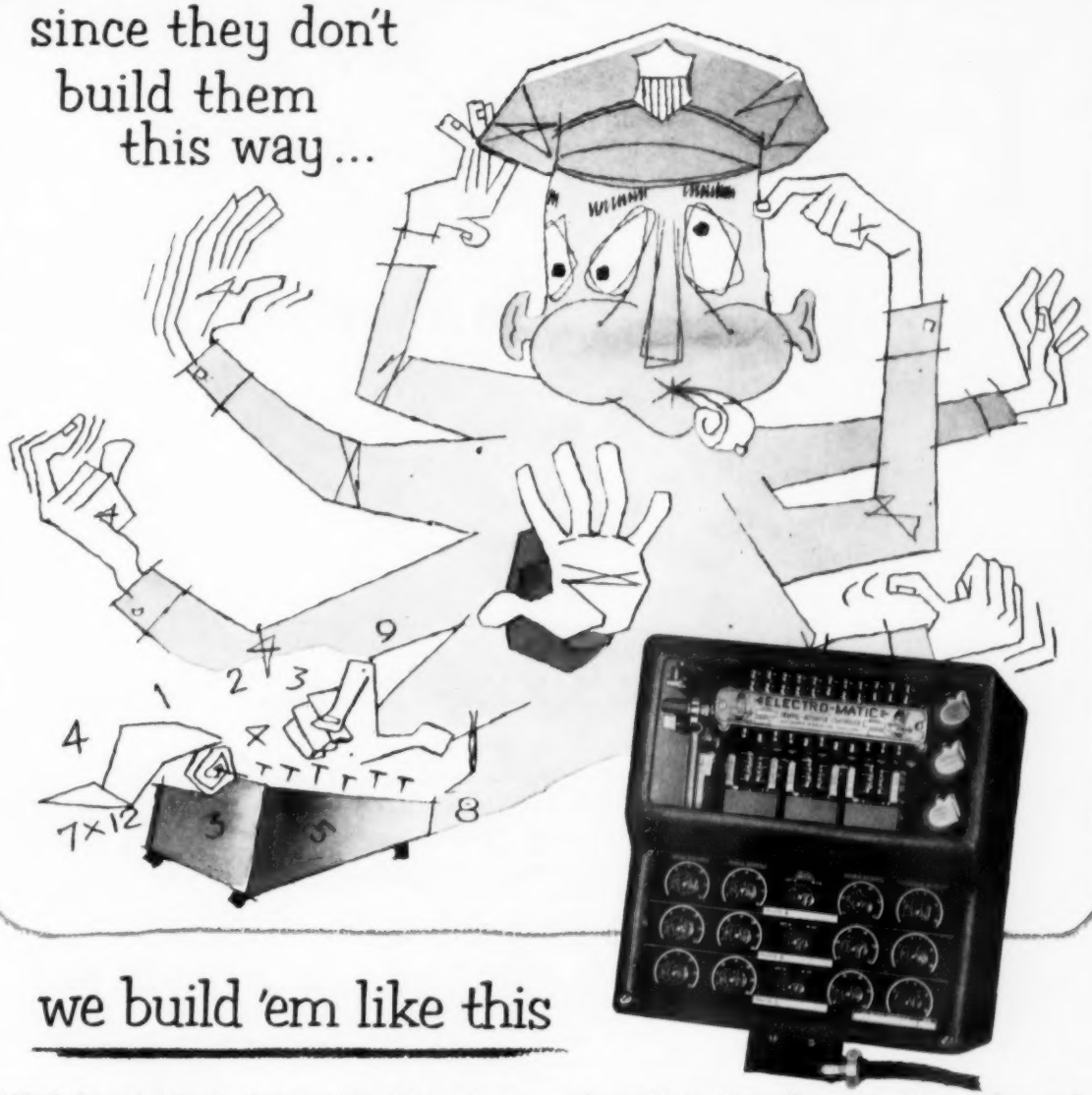
Thousands use our Readers' Service card to keep up to date . . . do you?

since they don't build them this way...



we build 'em like this

"Mythological Miracle Cops" *might solve* today's problems of congested intersections, but Electro-Matic Controllers *can most surely solve* them both for today and tomorrow.

Traffic engineers and police officers the country over rely on "Electronic Brains" to expedite traffic flow more efficiently than by *any other method.*

Electro-Matic Controllers, operating *without* volumetric limitations, continually adjust to the ever changing patterns of traffic volume thereby clearing intersections faster.

Policemen, previously pressed into traffic duty, can now be utilized to better advantage. Thus, the aims of efficiency and economy are *both* realized.

Electro-Matic Controllers are designed to cope with *your* most difficult intersections. *For details, write for further information.*

TRAFFIC ACTUATED

AUTOMATIC SIGNAL DIVISION
EASTERN INDUSTRIES, INC.
NORWALK • CONNECTICUT

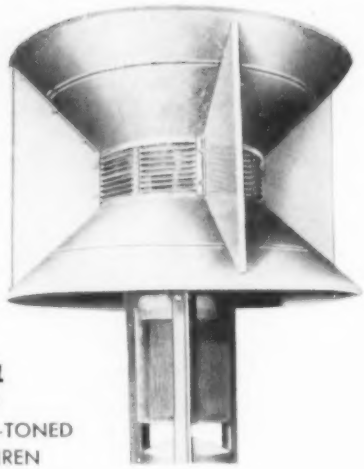
Need more facts about advertised products? Mail your Readers' Service card now.

Prepare

or pay the forfeit!

Prepare now or you may forfeit lives!

A Civil Defense warning system does more than protect against a possible air attack. Few sections of the country are immune from natural disasters. Tornadoes have already taken their spring toll and the most dangerous season is not yet here. Seasonal storms, floods, fires, earthquakes and other disasters take an appalling annual toll.



FEDERAL
S-D 10
SUPER DOUBLE-TONED
VERTICAL SIREN

FEDERAL THUNDERBOLT
SUPER POWERED
DIRECTIONAL SIREN

Case histories of recent disasters have shown a reduced injury and death toll in those communities with a well organized Civil Defense and disaster program, especially where they had an adequate warning signal system. The great majority of American municipalities who have completed adequate preparations are equipped 100% with FEDERAL AIR RAID SIRENS!

FEDERAL SIGN and SIGNAL CORPORATION

FORMERLY: FEDERAL ENTERPRISES, INC.

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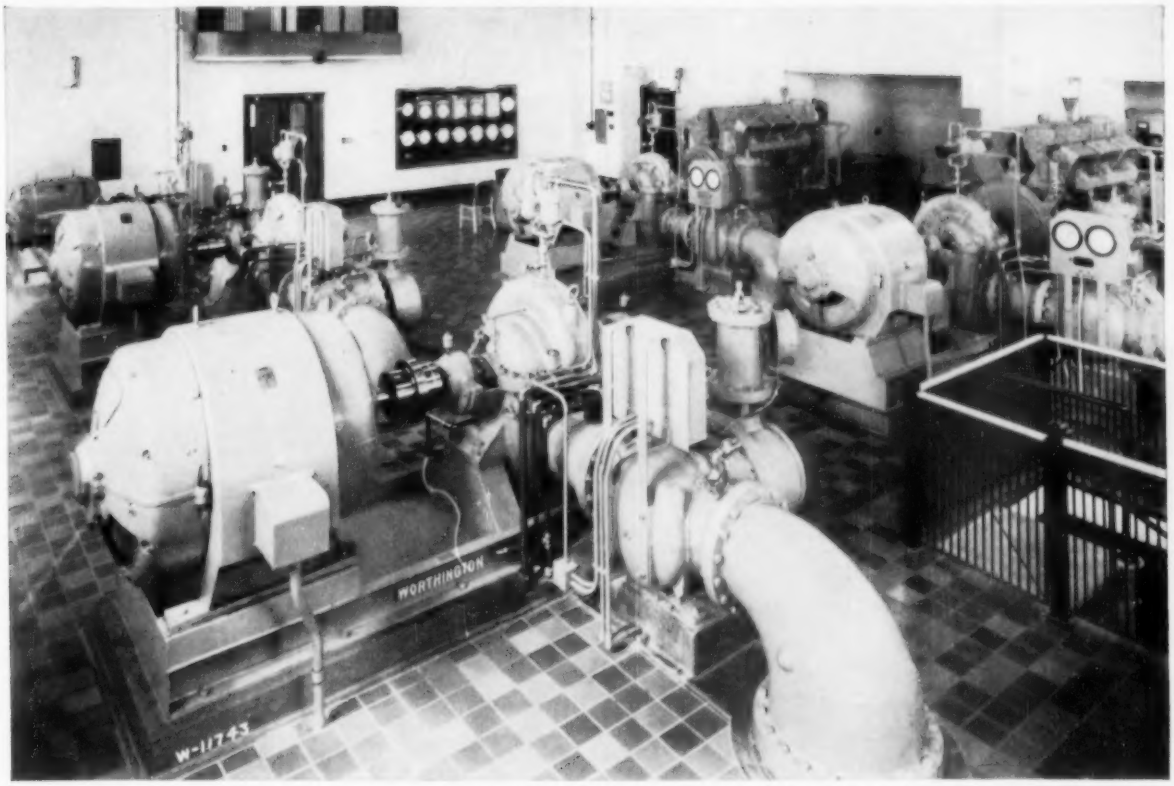


AS MODERN AS YOU'LL SEE ANYWHERE is this clean tile brick pump building at Evanston, Illinois, Water Works. At the left are three High Lift pumps—6-mgd, 8-mgd and 15-mgd—driven by Electric Machinery motors. At right are two 10-mgd High Lift pumps dual-driven by 350-hp E.M. motors and gasoline engines. Three other 125-hp Wash Water pumps are not shown.

Evanston Water Works– First on the North Shore– boasts modern Worthington-equipped pump room

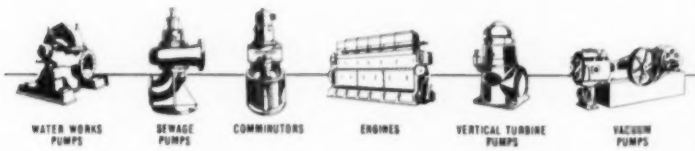
In the 1890's, it was Evanston, Illinois, that set the pace in water works facilities along the North Shore with the first filtration plant.

Today, this famous midwest city is still known by municipal engineers everywhere for its modern and efficient water-supply installation. The pump room pictured here is a vital part of these facilities.

Built in 1949, the new building houses eight motor-driven Worthington centrifugal pumps including three 10-mgd Wash Water pumps and three High Lift pumps—one 15-mgd, one 8-mgd and one 6-mgd. Two 10-mgd High Lift pumps are dual-driven. The complete water works installation was engineered by Alvord, Burdick and Howson of Chicago, Illinois, Consulting Engineers.

You'd naturally expect cities like Evanston, with reputations for the best in water works facilities, to demand the best in pumping equipment. Their choice is proof that *there's more worth in Worthington.*

Write for full details on Worthington's complete line of water and sewage works pumps and other public works equipment. Worthington Corporation, Public Works Division, Section W.2.1., Harrison, New Jersey.



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WORTHINGTON

Public Works Equipment

Get full details of this month's products . . . mail your Readers' Service card today.

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OSGOOD-GENERAL
CRANES AND EXCAVATORS

Some Breeds Dig Better

It takes years . . . of hard work, practical experience and painstaking effort to develop a thoroughbred "breed" . . . but the results are worth it! When you call on a thoroughbred he gives you all the power, speed and stamina in him, without urging.

For over a hundred years . . . since 1852 OSGOOD has been developing and improving a thoroughbred "line" of power cranes and excavators, studying the requirements of various type jobs and engineering new machines or improvements to fulfill these needs. OSGOOD-GENERAL machines will respond with a steady smoothness to an operator's demand . . . and they are rugged, with plenty of stamina for long continuous service.

Power Shovels • Hoes • Cranes • Drag-Clams • Piledrivers • ½-3 yds. • 10-63 Tons

OSGOOD-GENERAL

MARION, OHIO

OVER 100 YEARS OF ENGINEERING PROGRESS

. . . And Ring-Tite Joints for

RENSSELAER-COREY HYDRANTS

Now for the first time, Rensselaer Hydrants as well as valves are available with Ring-Tite Joints.

•

CONSTRUCTION TIME REDUCED

This feature will speed up hydrant installations and provide tight, flexible joints.

•

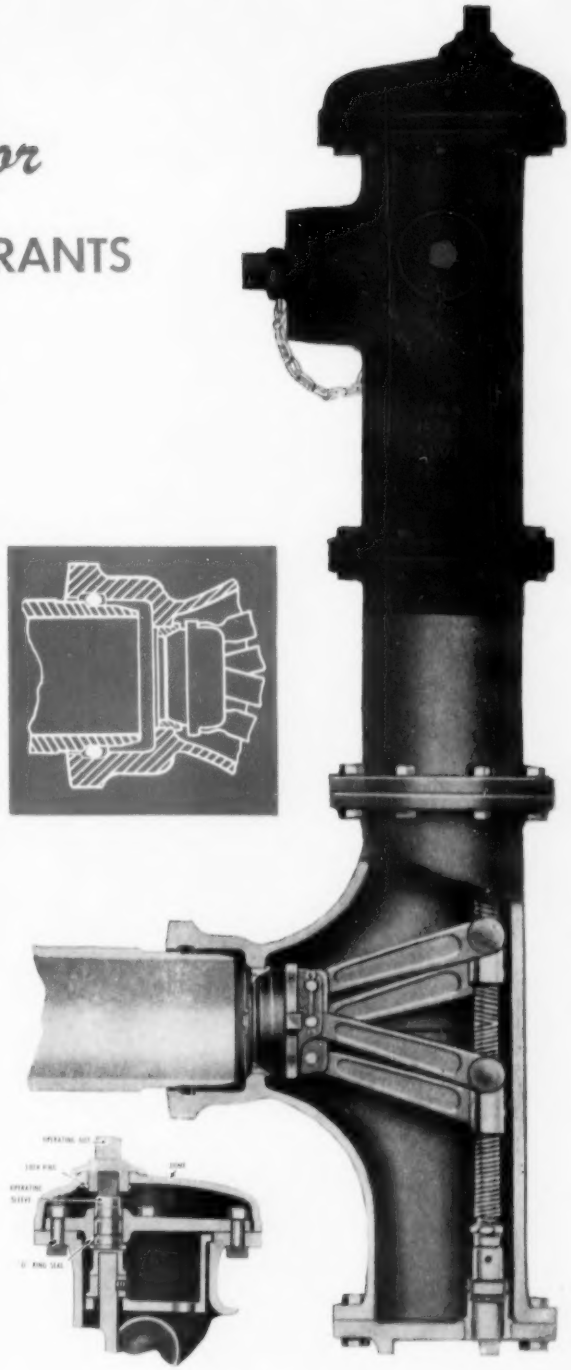
FOR ALL SIZES

Rennselaer Fire Hydrants 4" and 5" with Ring-Tite Bells can be connected to 4" and 6" and 8" Transite Pipes. Lugs are provided to tie the Hydrant to the pipe line.

•

Rensselaer Fire Hydrants are designed on the knuckle joint principle and open with the pressure. They are quick opening with free-flow, long radius curves. Will not freeze or flood and no digging is required for repairs or standpipe breakage.

The Rensselaer Hydrant has been preferred by superintendents, fire chiefs and maintenance men for more than half a century.



RENSSELAER HYDRANT WITH "O"-RING SEAL AND RING-TITE JOINT.

Ask for Bulletin G. See Rensselaer at Seattle, Booth Nos. 53 and 54

Rensselaer VALVE CO. TROY, N. Y.

GATE VALVES • FIRE HYDRANTS • SQUARE BOTTOM VALVES • CHECK VALVES • AIR RELEASE VALVES

SALES REPRESENTATIVES IN PRINCIPAL CITIES

NASHVILLE, TENN.

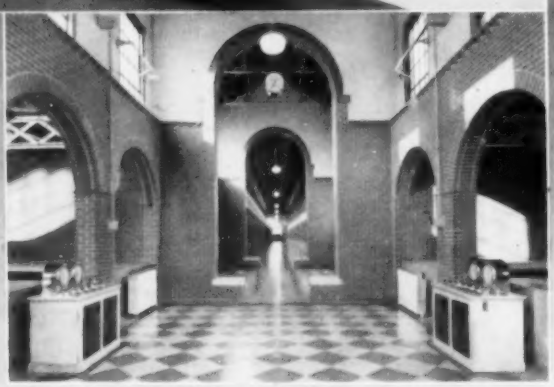
Nashville Filter Plant

(EXPANSION COMPLETED IN 1951)

THE CHESTER ENGINEERS
Consultants
PITTSBURGH, PENN.

Nashville Filter Plant showing aerator, grit chamber, mixing basins, setting basins, and filter building.

Mr. Robert L. Lawrence, Jr., Director and Chief Engr. Water Works Dept., at the Master Control Table in the original plant lobby.



Filter Operating Gallery.

This 56 MGD Plant is a good example of what can be accomplished through: (1) careful engineering, (2) improved chemical treatment techniques, and (3) efficient operation by means of complete instrumentation and control. These factors have resulted in substantial savings in the cost of treated water at Nashville.

Builders Water Works Equipment (installed in the new section by J. B. Michael & Co., Inc.) has contributed to this successful history, both in the original plant and in the recently completed addition. For a detailed description of this equipment — Filter Controllers and Gauges, Pneumatic Master Control System, Chronoflo Meters and Summator, and Wheeler Filter Bottoms — address Builders-Providence, Inc., Providence 1, Rhode Island.

BUILDERS-PROVIDENCE

DIVISION OF B-I-F INDUSTRIES, INC.

BUILDERS IRON FOUNDRY • PROPORTIONEERS, INC. • OMEGA MACHINE CO.

B·I·F METERS FEEDERS CONTROLS

EASY ALIGNMENT!

Pipe deflections—resulting from varying flange thicknesses and restricted bolt play—presented no problem to engineers designing Cleveland's 22 million dollar Nottingham Filtration Plant. In joining cone valves to a 36″ wash water line, for example, they specified Dresser Couplings which permit up to 3° deflection, yet maintain watertight joints.

In addition, Dresser Couplings provide easy entrance into the line, simplify maintaining and replacing the valves.

For information on Dresser Coupling applications that may suggest new solutions to old problems—help you get a *superior* job on water, sewage and industrial waste projects—contact your local piping supply house or write us.

DRESSER® COUPLINGS

Dresser Manufacturing Division, 69 Fisher Ave., Bradford, Pa. (One of the Dresser Industries). Warehouses: 1121 Rothwell St., Houston; 101 S. Airport Blvd., S. San Francisco. Sales offices also in: New York, Philadelphia, Chicago, Toronto.

It's a fact . . . our handy Readers' Service card is the way to get new catalogs.

Question:

Can we get installation savings and performance too?

Answer:

Yes...with the new Ring-Tite Coupling

On this Utah job, snow, ice and difficult conditions caused no installation slowdown.

In this California installation, flexible Ring-Tite joints permitted easy conformance to curves.

Speeds assembly of Transite Pressure Pipe

In state after state, contractors are learning that Transite® Pressure Pipe and the new Ring-Tite® Coupling provide fast, sure pipe line assembly with tight, dependable joints . . . strength to assure lasting, trouble-free water mains through the years.

With Ring-Tite, installation costs less—assembly follows digger closely. Typical contractors' comments: "On entire job, trencher and backfiller seldom over 150 feet apart . . ." "Laid 6" Class 150 Ring-Tite at a rate of 5000 feet per 8 hours."

The design of the Ring-Tite Coupling permits quick, easy alignment. To assemble, rubber rings are simply popped into grooves. Then lubricated pipe ends slide in under rings smoothly, easily and surely.

Pipe ends stop positively—with ends automatically separated within coupling. This separation gives the line flexibility to withstand shock and vibration, relieves line stresses, permits conformance to curves. Installations can be completed under adverse weather, temperature or terrain conditions. No complicated equipment is required.

Transite Pressure Pipe and the Ring-Tite Coupling are made of asbestos and cement. Strong and durable, they cannot rust; are highly resistant to corrosion. Tested to A.W.W.A. specifications.

For the new Ring-Tite folder TR-142A—please write to Johns-Manville, Box 60, New York 16, N. Y.

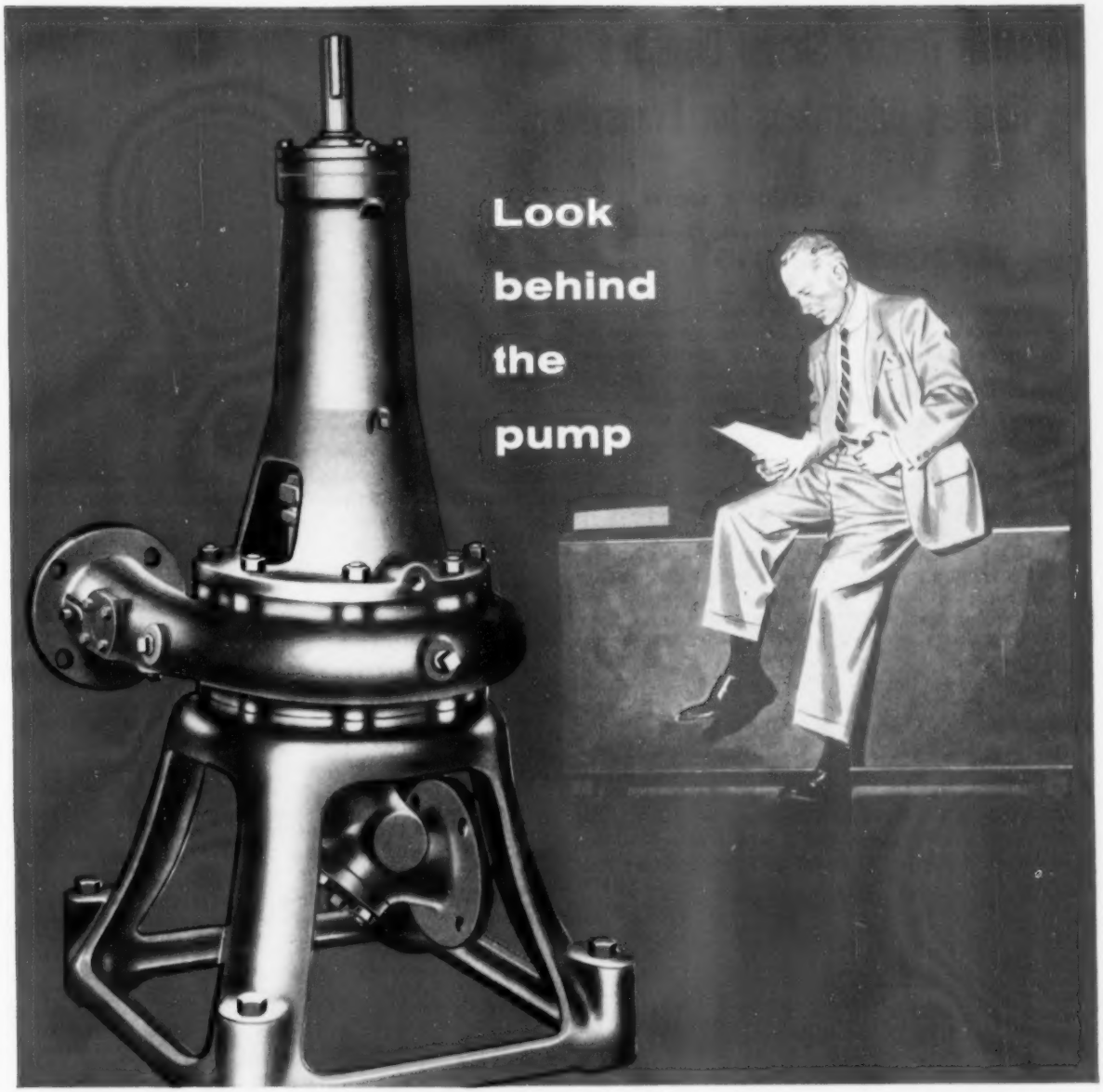
(See us at Seattle—Booths 70-72 A.W.W.A. Convention)

JM PRODUCTS

Johns-Manville TRANSITE PRESSURE PIPE

NOW WITH THE RING-TITE COUPLING

Get full details of this month's products . . . mail your Readers' Service card today.



How much for maintenance?

In figuring the cost of a trash pump, what do you allow for maintenance . . . how much to clear out the trash that clogs the impeller? Will it be daily? Every other day? Weekly?

Or figure it this way. What price a pump that won't clog . . . that will virtually eliminate maintenance? That's why you should figure the Fairbanks-Morse Bladeless Impeller Pump! Its unique whirling tube won't clog . . . there are no blades or projections to catch and hold trash.

This is just one more example of the quality that is Fairbanks-Morse . . . in design, materials, workmanship, a standard of quality that gives you more for your pump dollar. For pump performance you can depend on, rely on the world's largest manufacturer of a complete pump line. See your Fairbanks-Morse Branch or write Fairbanks, Morse & Co., 600 S. Michigan Ave., Chicago 5, Ill.

FAIRBANKS-MORSE

a name worth remembering when you want the best

PUMPS • SCALES • DIESEL LOCOMOTIVES AND ENGINES • ELECTRICAL MACHINERY • RAIL CARS • HOME WATER SERVICE EQUIPMENT • FARM MACHINERY • MAGNETOS

Now's the time to mail this month's Reader's Service card.

Versatile Tractor Shovel Disposes of Garbage, Handles Other Jobs for Evansville, Wis.

by **BRADEN E. WOLFF**
Superintendent of Streets, Evansville, Wis.

The HD-5G Tractor Shovel with 1-yd. bucket spreads refuse in old gravel pit, which was previously a dangerous menace.

Like thousands of other towns, we must buy equipment that can handle a wide range of jobs, because we operate on a limited budget and often cannot justify the purchase of a machine just to handle a certain job. The equipment versatility we seek is typified by an Allis-Chalmers HD-5G, 1-yd. Tractor Shovel, which we bought primarily for garbage and rubbish disposal but which we use for other jobs, too.

The Sanitary Landfill system of disposal is used in our town because of its economy, safety and benefit in recovering otherwise useless land. Refuse is picked up by a 10-yd. garbage truck and an open truck, and is hauled to an old gravel pit covering about three acres on the edge of town. The tractor shovel spreads the material, compacts it by traveling over it and then covers the refuse with dirt or sand. The landfill can be built up in successive layers until the level is the same as that of surrounding land. Cover material consists of street sweepings, discarded foundry sand, and overburden from a sand pit adjacent to the landfill.

It is estimated the old pit now being used will provide disposal capacity for three or four years. When filled, this one-time menace will be used for a playground. There are other pits nearby that also will be put to such double use — first a means of refuse disposal, then a site for healthful playgrounds for the community. Needless to say, citizens and town officials are very happy with the new system.

We find that our collection equipment can handle Sanitary Landfill operations efficiently in a total of two days a week. The remainder of the time, the tractor shovel is available for sidewalk and street work. It is used for both construction and maintenance, as well as stockpiling, loading — in fact, any jobs there are to be done. It either travels from job to job by its own power or is hauled on a trailer behind one of the trucks.

★ ★ ★

Counties, cities and towns throughout the country are finding Allis-Chalmers Tractor Shovels the ideal machines for all-round work. They are always busy because they do so many jobs so well. Usefulness is further widened by a variety of quick-change attachments for the HD-5G, including 2-yd. bucket for snow, coal and other light materials; trench-hoe for digging trenches and foundations; blades for dozing; and rear-mounted scarifier for breaking up old surfacing and for more efficient excavating.

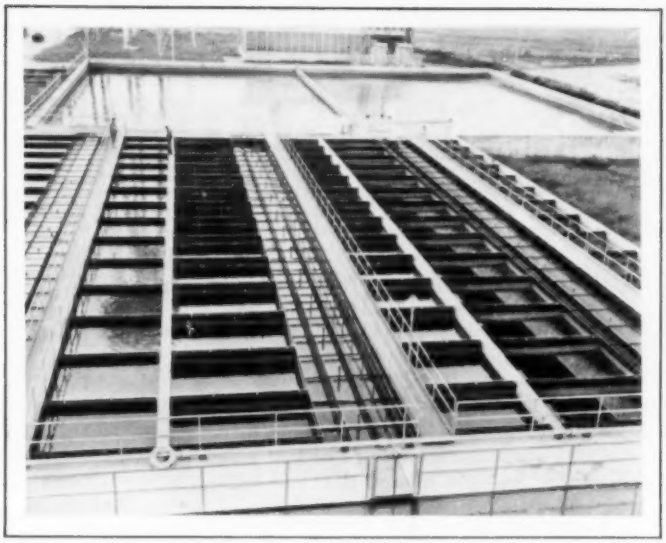
See the HD-5G and the three larger size tractor shovels at your Allis-Chalmers dealer's. Let him show what they can do on *your* job.

After packing material well with its 16,200 lb. of weight, the tractor shovel carries fill from nearby pile and spreads it to completely cover refuse.

Portion of pit in foreground has already been filled to level of surrounding land. Pit in background is yet to be filled. Land will be used as a playground as it is filled in.

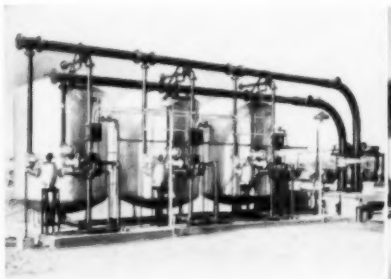
ALLIS-CHALMERS
TRACTOR DIVISION • MILWAUKEE 1, U. S. A.

Thousands use our Readers' Service card to keep up to date . . . do you?



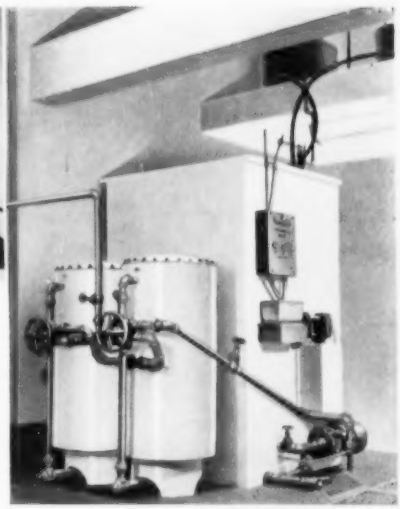
PRECIPITATOR. Coagulation, precipitation and settling in one operation! Minimum space . . . stable effluent. Reduces turbidity, color, taste, odor, hardness, iron, manganese, alkalinity, silica.

WHICH Permutit Process will solve YOUR water problem?



ZEOLITE (Ion Exchange) SOFTENERS remove total hardness. Reduce iron and manganese. Permutit multiport-valve control is fully automatic! Saves operator's time . . . increases efficiency.

FILTERS. Rapid type gravity filters in concrete or steel. Vertical or horizontal pressure filters. Manual or fully automatic multiport-type control for single units or batteries.



PACKAGE WATER CONDITIONING PLANT. Reduces organic matter, turbidity, taste, odor, hardness, iron, manganese, alkalinity. Compact . . . ideal for small municipalities. Flow rates up to 50 gpm.

Permutit can help you decide . . .

PERMUTIT will make a free analysis of your city's water supply and make recommendations to you or your consultants. Remember—only Permutit manufactures both ion exchangers and all types of water conditioning equipment.

Write today for information on municipal water conditioning equipment. The Permutit Company, Dept. PW-5, 330 West 42nd Street, New York 36, N. Y.

Water Conditioning Headquarters for Over 40 Years

PERMUTIT®

Surface Discharge Head
Combination Gear and Motor Drive

ARE YOU PLANNING TO GO UNDERGROUND FOR MUNICIPAL WATER ?

The best way to get at that extra supply of water under your feet is with one of these powerful Worthington vertical turbine pumps. These modern pumps will pull up all the water you need—at an operating cost that's easy on your budget.

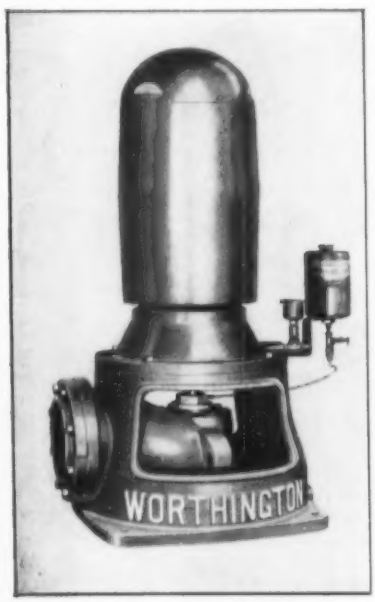
You can get Worthington vertical turbine pumps for deep or shallow well operation in capacities ranging from 50 to 10,000 gallons per minute, oil- or water-lubricated models. There are models for every kind of drive, too.

Remember, over a hundred years of pump-building experience have gone into making these the most efficient and durable pumps you can buy.

DATA ON UNDERGROUND WATER SOURCES

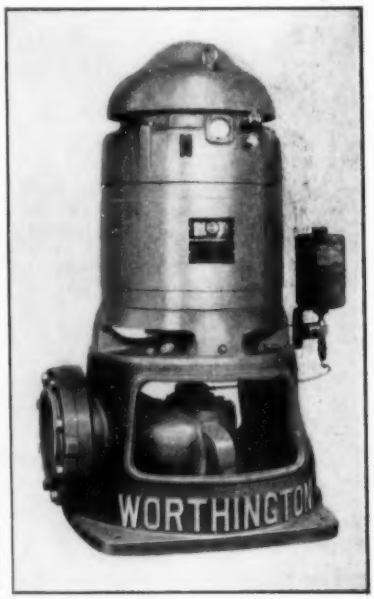
As a vertical turbine pump specialist, your Worthington distributor can provide you with engineering service including data on underground water sources, exploratory drilling and water surveys. He's had long experience in handling drilling, installation and service. He'll also be glad to send you a booklet on vertical turbine pumps for municipal water supply. Write for his name and address to Worthington Corporation, Vertical Turbine Division, Succasunna, New Jersey, or Denver, Colorado.

D-3.14



Surface Discharge Head-Belt Drive

Surface Discharge Head-Right Angle Gear Drive



Surface Discharge Head-Motor Drive

WORTHINGTON

WATER WORKS PUMPS SEWAGE PUMPS COMMINUTORS ENGINES VERTICAL TURBINE PUMPS

Need more facts about advertised products? Mail your Readers' Service card now.

For Chlorine... contact JONES

Fast, Efficient Deliveries

to any point in the country

ONE convenient and dependable source for ALL Your Chlorine Products

LIQUID CHLORINE	CALCIUM HYPOCHLORITE	SODIUM HYPOCHLORITE
in 16 lb. . . . 105 lb. . . . 150 lb. cylinders and 1 ton containers.	70% available Chlorine . . . 3¼ and 5 lb. tins and 100 lb. drums	Gallons . . . Carboys and Tank Wagon Deliveries

No matter where your plant is located, Jones will deliver your chlorine with utmost efficiency, speed and dependability . . . and in the *right container* to meet your requirements.

But service is just part of the Jones story. Jones Chlorine products are processed by quality control methods to assure *uniform* top quality. Jones Chlorine has been specified for years by the U. S. Army and Navy as well as hundreds of cities and private concerns. If you have a problem in the field of water purification or chlorination of sewage and industrial wastes, let us help you. Write, phone or wire for information.

JOHN WILEY JONES CO.

Caledonia, N. Y., Beech Grove, Ind. (Indianapolis), Jacksonville, Fla., Charlotte, N. C., Torrance, Calif.

Now's the time to mail this month's Reader's Service card.

Aircraft fueling area sealed for less than 6¢ per sq. ft.

...with COLFIX® JET SEAL

10,000 sq. yds. of Hanger Apron and Fueling Area for Pan American Airways Corporation at the Seattle-Tacoma International Airport were recently sealed with Colfix Jet Seal—for protection against wear, weather and solvent action of fuels.

This job was let at a contract price of under 6¢ per sq. ft. Work began with cleaning of the area, followed by a rapid squeegee and broom application of diluted Colfix Primer. This method assures good bond even to a dusty surface, and gives added insurance against fuel transmission in vapor form.

Seal Application

Following the prime, Colfix Jet Seal, mixed with some water to free-flowing consistency, was applied with rubber-faced squeegees. Three applications were made in order to get smooth, uniform coverage of one quarter gallon per square yard (based on the material as received in the container). Each squeegee application was brushed immediately and the area opened to traffic as soon as the Jet Seal had set.

For Safety . . . and Long Life

Colfix Jet Seal embodies a coal tar base and oil-proof elastomers that provide an enduring solvent-resistant seal for all bituminous pavements. Its value has been proved on numerous airport runways, parking areas and hard-stands where it effectively protects these surfaces against the solvent action of gasoline and aircraft fuels. In addition, it provides a durable, skid-proof surface that resists heat and weathering.

Colfix Jet Seal is a "bodied" product that fills surface voids. It requires no sand cover. Jet Seal is one of the easiest materials to apply by squeegee, brush or industrial spray equipment. It sets rapidly and the sealed surface may be opened to traffic with a minimum of delay.

For full information on Colfix Jet Seal call our office nearest you.

Here's another typical Colfix Jet Seal job at Baltimore's Friendship International Airport.

Colfix Jet Seal is made by the makers of Walk-Top and Wearcoat—protective coatings for Playgrounds and Tennis Courts used successfully for over 20 years.

AMERICAN Bitumuls & Asphalt COMPANY

200 BUSH STREET, SAN FRANCISCO 4, CALIFORNIA

E. Providence 14, R. I. Perth Amboy, N. J. Baltimore 3, Md. Mobile, Ala. Columbus 15, Ohio
Tucson, Ariz. Seattle, Wash. Baton Rouge 2, La. St. Louis 17, Mo. Inglewood, Calif.
Oakland 1, Calif. Portland 7, Ore. Washington 5, D. C. San Juan 23, P. R.

Now's the time to mail this month's Reader's Service card.

In addition to serving as a 6,000-pound grader, the Maintainer can be equipped with hydraulic attachments for bulldozer, lift-loader, road planer, berm leveler, highway mower, broom, snow plow, patch roller and side dozer service.

Look What Typical Owners Say . . .

A MUNICIPALITY IN MAINE—"... performed jobs unbelievable for a machine of this sort. I can not laud too highly the work it has done."

A COUNTY IN MICHIGAN—" . . . This (Huber Maintainer) eliminated the use of a tractor and small grader and one operator with consequent savings in cost."

A CONTRACTOR IN FLORIDA—"They (Huber Maintainers) have earned us more money than any other piece of equipment we own."

A STATE IN THE NORTHWEST—"For the concrete pavement shoulder work which we are continually confronted with, the Maintainer has been a very satisfactory unit."

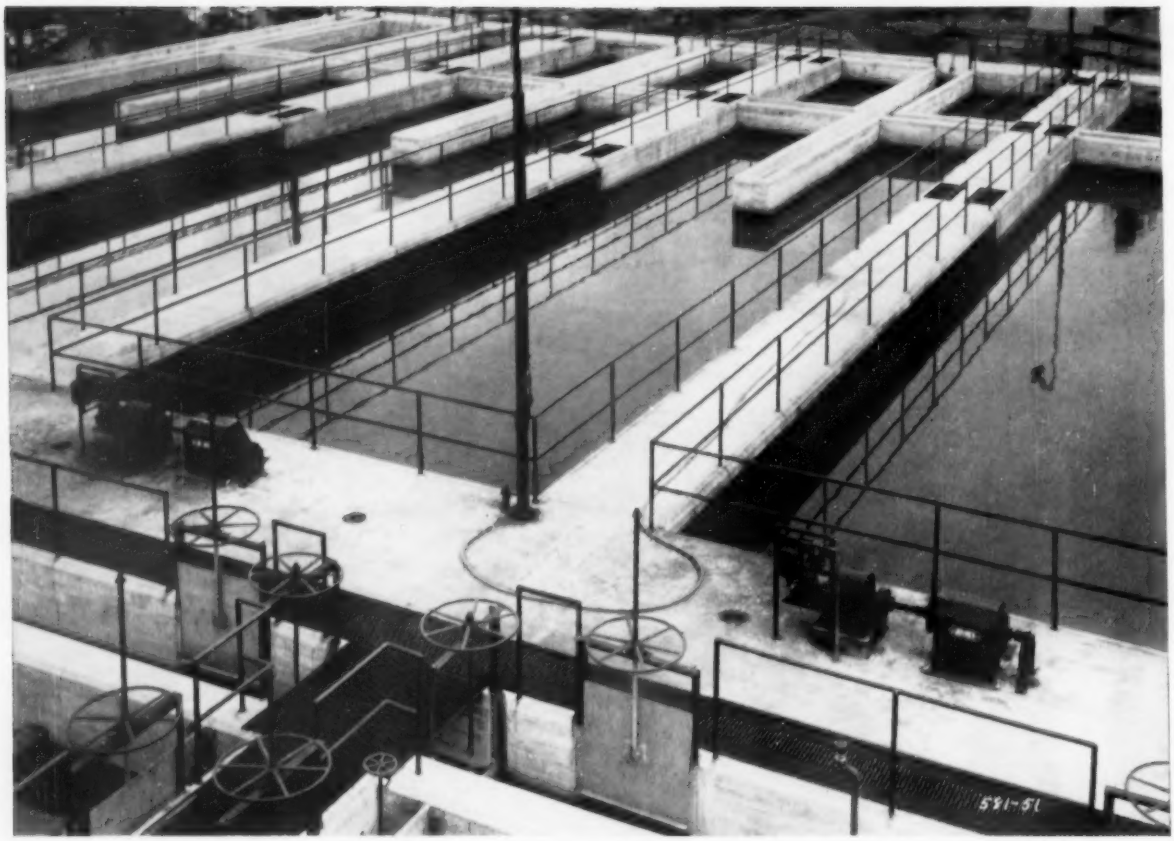
A TOWNSHIP IN PENNSYLVANIA—"The Huber Maintainer is tops with us (grading, loading, cleaning ditches, laying pipe)."

A CONTRACTOR IN CONNECTICUT—"Our Huber Maintainer has cut down our labor costs 50%."

HUBER MANUFACTURING CO. • Marion, Ohio, U. S. A.
Manufacturers of Huber Maintainers, Graders and Complete Line of Rollers

HUBER

Thousands use our Readers' Service card to keep up to date . . . do you?



A MODERN WATER WORKS

Jeffrey Rapid Mixers, FLOCTROLS for the mixing basins and Sludge Collectors for the settling basins all help make this City Water Works plant one of the most efficient in existence today. (Name on request.)

City engineers like Jeffrey equipment for both water and sewage treatment . . . they like the way our engineers help them work out the best possible method to get results. You, too, can take advantage of Jeffrey experience and engineered equipment. Write us today.

Catalog No. 833

THE JEFFREY MANUFACTURING CO.

ESTABLISHED 1877

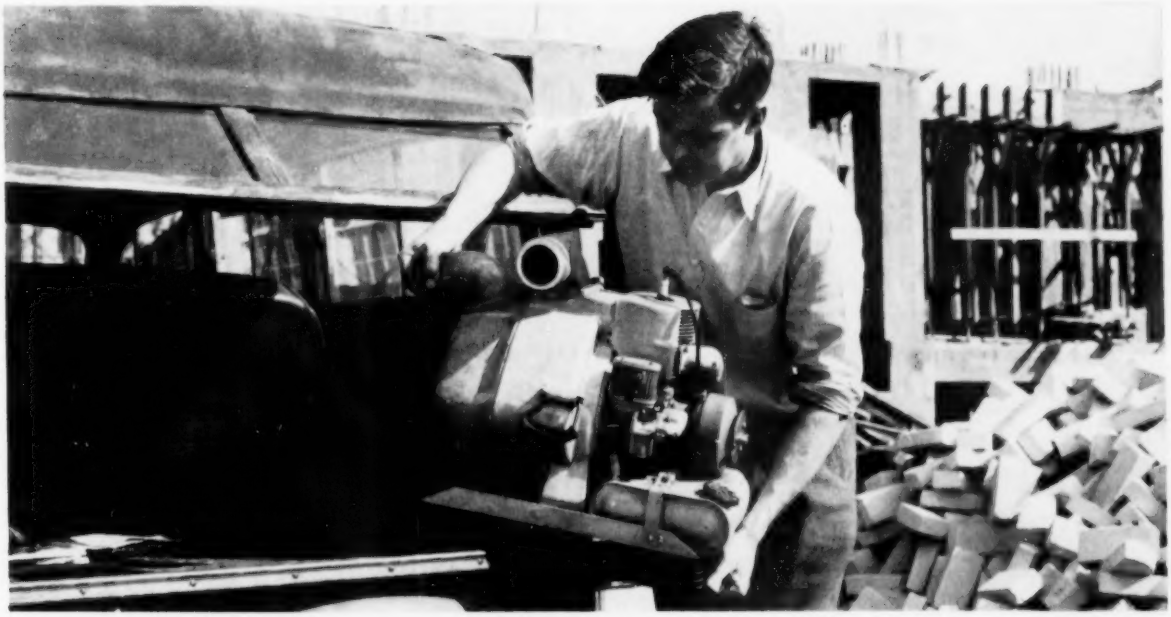
Columbus 16, Ohio

sales offices and distributors in principal cities

PLANTS IN CANADA, ENGLAND, SOUTH AFRICA

IF IT'S MINED, PROCESSED OR MOVED
. . . IT'S A JOB FOR JEFFREY!

Need more facts about advertised products? Mail your Readers' Service card now.



A HOMELITE PUMP

is **FIRST** on the job in more ways than one

FIRST to get on the job . . .

FIRST to complete the job.

There is the real action story of Homelite Gasoline Engine Driven Pumps.

They're first to get on the job, because they're small, compact, *carryable* . . . easy to put, by one man, anyplace you need them. Yes, and they're first to complete the job, because of their quick starting, self-priming, 28 foot suction lift, and pumping capacity which ranges from automatically controlled seepage up to 15,000 gallons per hour.

Before buying any other pump, see a Homelite Pump in action.

Write and we'll gladly give a free on-your-job demonstration.

Manufacturers of Homelite
Carryable Pumps • Generators
Blowers • Chain Saws

PERFORMANCE · DEPENDABILITY · SERVICE

HOMELITE
CORPORATION

2105 RIVERDALE AVENUE • PORT CHESTER, N. Y.

Canadian Distributors: Terry Machinery Co., Ltd., Toronto, Montreal, Vancouver, Ottawa.

It's a fact . . . our handy Readers' Service card is the way to get new catalogs.

HOW LARGE IS YOUR COMMUNITY?

C-E RAYMOND SEWAGE DISPOSAL SYSTEMS SERVE BOTH LARGE AND SMALL

IN BALTIMORE, FOR EXAMPLE – the new sludge drying plant was placed in service late last year. Serving a population of nearly a million people, the new installation is designed to dry the sludge from 125 million gallons of sewage a day.

An important part of the huge Back River Treatment Works, the plant was designed by Whitman, Requardt & Associates, Baltimore.

Three C-E Raymond Flash Drying Systems dry the digested filtered sludge, to produce high quality fertilizer at the rate of 15,000 to 27,000 tons a year.

Many other large communities have discovered the practical answer to sludge disposal problems in C-E Raymond Systems. Chicago . . . Los Angeles . . . San Francisco . . . Washington – these large cities alone have in operation or under construction C-E Raymond equipment to serve an equivalent population greater than 11,000,000.

The popularity of C-E Raymond Systems does not stop with larger cities, however. In communities with equivalent populations as low as 6,000, this equipment has been proved in years of actual service. As a matter of fact, the aggregate capacity of C-E Raymond Systems installed, under construction or on order is *nearly 50% more than the total of all other heat methods of sludge disposal combined.*

So, whether your community is large or small – look to the leader for the most efficient end to your sludge disposal problems. For details, just get in touch with the C-E Raymond office nearest you.

B-717

COMBUSTION ENGINEERING, INC.

RAYMOND DIVISION: 1315 North Branch Street, Chicago 22, Illinois

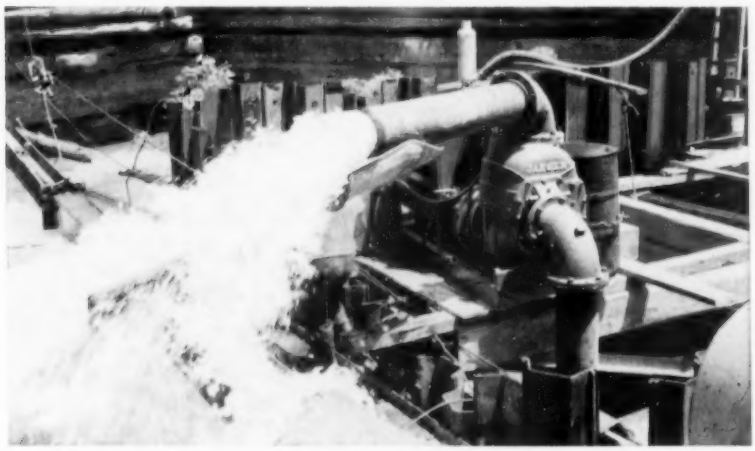
Western Office: 510 W. Sixth Street, Los Angeles 14, Cal. • Eastern Office: 200 Madison Avenue, New York 16, N. Y.

ALSO FLASH DRYING AND INCINERATION SYSTEMS FOR INDUSTRIAL WASTE DISPOSAL

Hi-performance Jaeger pumps cut water-handling costs

New Model 2PN moves all the water a 2" hose can handle

This latest Jaeger 2" pump delivers its rated 10,000 gph when operating at only 2400 to 2550 rpm (as much as 400 rpm slower than similar pumps). It will actually pump all the water that can be pulled through a 2" suction line under average pumping conditions. You'll find it conservatively rated, even at heads well above 100 ft. Weighs only 190 lbs. including big pneumatic tires, measures only 24" x 21" x 26" high, yet it's built for heavy duty service with 20% steel shell, reversible liner plate, long-life Jaeger Lubri-Seal on shaft, impeller adjustable for wear and powerful Wisconsin AKN engine of 5.3 hp at 2500 rpm.

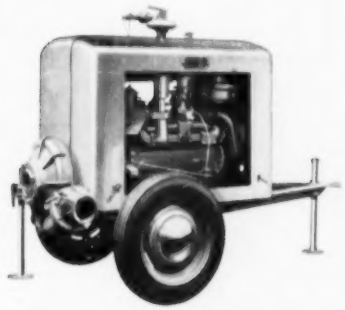


Pumping 4,000 gpm with low-cost diesel power

Because they develop their full rated volume at low operating speeds, big Jaeger pumps are ideally suited for diesel operation on big cofferdam and well point work. The Jaeger Model 10PD above is pumping 4000 gpm at 1500 rpm. This high efficiency at fuel-saving, engine-saving speeds is an exclusive characteristic of Jaeger "Sure-Prime" pumps. It requires larger shells and impellers but pays off in performance. Jaegers prime without engine-racing, don't vapor-lock on hard pulls, consume less fuel and average thousands of hours longer service than pumps that must run at higher speeds.

Latest type jetting pumps in 3", 4", 5", 6" sizes

For a wide range of volumes, and pressures up to 275 psi, Jaeger has developed the most modern type of high pressure pumps . . . self-priming at the rate of 1 second per foot of lift, equipped with enclosed impellers, labyrinth sealing rings, positively lubricated shaft seals, automatic spring-actuated check valves, heat-resisting stellite-valved engines:



Model 3CPH delivers 420 gpm at 40 lbs., 125 gpm at 130 lbs., with air-cooled Wisconsin VF-4 (25 hp @ 2400 rpm).

Model 4CPH delivers 700 gpm at 75 lbs., 325 gpm at 200 lbs., with 6 cylinder engine of 218 cu. in. displacement (80 hp @ 2500 rpm).

Model 5CPH delivers 825 gpm at 80 lbs., 200 gpm at 250 lbs., with 6 cylinder engine of 236 cu. in. displacement. (95 hp @ 2600 rpm).

1½" to 10" Electric Pumps

Jaeger "Sure Prime" pumps with electric motor drive are available for all types of dewatering, including the operation of Jaeger Well Point Systems. The characteristic low speed (1150 rpm) operation of Jaeger 6" to 10" electric pumps results in much longer life. Jaeger's oversize shells, holding more priming water, also prevent overheating and vapor-lock even when exhausting the longest well point header lines.

For engineering service on pumping problems, or specific information about any Jaeger pumps, see your Jaeger distributor or write. For file data, request Catalog P-4.

THE JAEGER MACHINE COMPANY

400 Dublin Avenue, Columbus 16, Ohio

TRACTOR LOADERS • COMPRESSORS • CONCRETE MIXERS • PAVING MACHINES

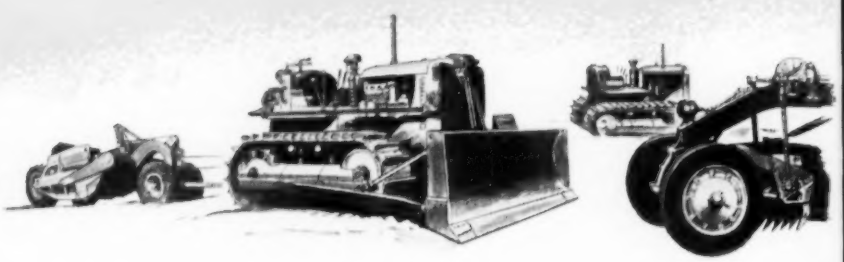
Now's the time to mail this month's Reader's Service card.

ANNOUNCING A

$10,000 GUARANTEE ON USED EQUIPMENT!

Never before a guarantee like this! Only your CATERPILLAR DEALER offers a "BONDED BUY" on used Caterpillar-built equipment backed by a bond of $10,000.

BONDED BUY



Your Caterpillar Dealer now offers you a "BONDED BUY" on used Caterpillar-built equipment backed by a bond of $10,000, issued by The Travelers Indemnity Company. He gives you this protection when you purchase a "BONDED BUY" machine.

This is the *first* time in the heavy-duty machinery field that such an offer has ever been made!

You are also offered two other classes of used equipment buys—"Certified Buy" and "Buy and Try." These cover used units of *any* make.

What does this mean to you? *It takes the guess and gamble out of buying used equipment.* You know what you're getting. Your assurance is in writing. What's more, *no matter what your needs, cost-wise or work-wise,* you have a *choice* to meet them.

Only your *Caterpillar Dealer* offers you this across-the-board selection. The best source of new machines, he's also your best source of used machines. Whether you're in the market for one, a few or many, he's the man to see for your *best* buy. See him today for complete details on guaranteed used machines!

Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

DON'T GUESS OR GAMBLE ON USED EQUIPMENT

You KNOW what you're getting at your CATERPILLAR DEALER

Your Caterpillar Dealer offers you three clear-cut classes of used equipment. He backs each one in writing. You buy with confidence, sure that the equipment is honestly described. See him for the best values on the market!

(1) "BONDED BUY" Only the best in used Caterpillar-built equipment. Each "BONDED BUY" machine is backed by a Dealer's Guarantee Bond equal to the purchase price of the machine up to a maximum of $10,000. This provides a guarantee for thirty days against unsatisfactory performance due to defective parts. If a part should prove defective within the guarantee period under the normal conditions of your job and with proper maintenance, your dealer will put your machine back into operating condition *with no charge to you for parts and labor* up to the amount of the bond. The Dealer's Guarantee Bond is backed by The Travelers Indemnity Company. Your Caterpillar Dealer gives you this protection with your purchase of a "BONDED BUY" machine. Look for the "BONDED BUY" symbol—it's your assurance of the best in used equipment.

(2) "CERTIFIED BUY" Next best buy in used equipment! "Certified Buy" covers machines of any make in good condition. Your performance guarantee is in writing backed by your Caterpillar Dealer.

(3) "BUY AND TRY" Bargains in used machines of any make. Buy and try them for a period mutually agreed upon by you and your Caterpillar Dealer. Each "Buy and Try" machine carries his written "money-back" agreement.

"BONDED BUY" assurance effective in the United States and Canada

CATERPILLAR

REG. U. S. PAT. OFF.

DIESEL ENGINES • TRACTORS • MOTOR GRADERS • EARTHMOVING EQUIPMENT

BEST BUYS IN NEW AND USED EQUIPMENT

Copr. 1954, C. T. Co.

Plant of Unusual Design Treats Surface Water for Houston

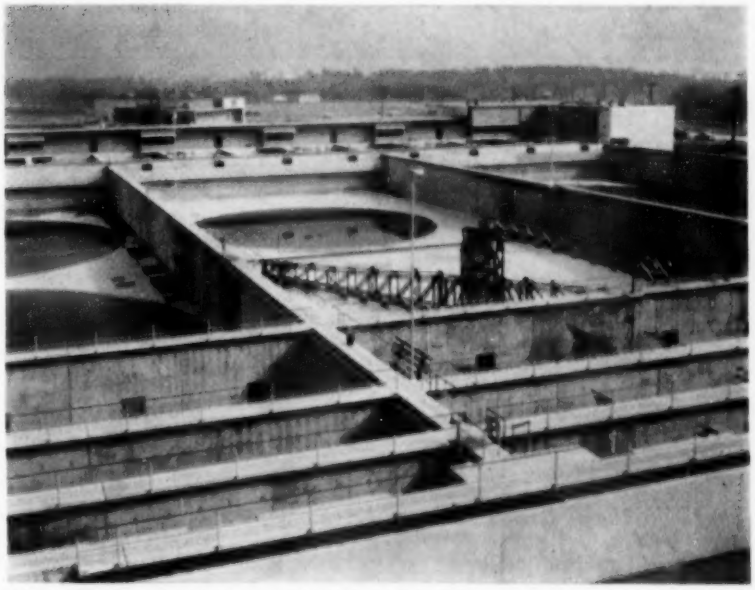
NAT P. TURNER

Freese, Nichols & Turner,

Engineers, Houston, Texas

ONE of the few large cities in the world depending entirely on wells for its water supply, Houston, Texas, will begin a gradual shift to surface water in 1954. Until recently, water supply in Houston was no problem. The area for many miles in three directions is underlain with thick beds of water-bearing sand hundreds of feet in thickness. These yield an excellent quality of water in quantities that have appeared limitless. This water supply was in a large measure responsible for the development, in recent years, of a tremendous complex of water-using industries attracted by Houston's deep seaport and the natural resources of the area; but the combined industrial and municipal demand for water, growing at a phenomenal rate, has resulted in a rapid drop in the pumping level of the thousands of wells in the area, and a corresponding increase in the cost of raw water.

The San Jacinto River project had its inception twenty years ago as a solution to this problem. In 1950, after many years of study and discussion, the City of Houston undertook actual construction of the project. Prime component of the system is Lake Houston, a 160,000-acre-foot-reservoir on the San Jacinto River, capable of a safe annual yield of 150 million gallons daily. The City hopes that, with this increment of supply, the aggregate draft on ground water in the metropolitan area can be held to its present 180 MGD. The river, if fully developed, can yield some 600 MGD. Lake Houston will inundate 12,800 acres and will have an average depth of about 13 feet at spillway level. Future supply, beyond the capabilities of the ground-water capacity and that of the San Jacinto River, can be developed on the nearby Trinity River.



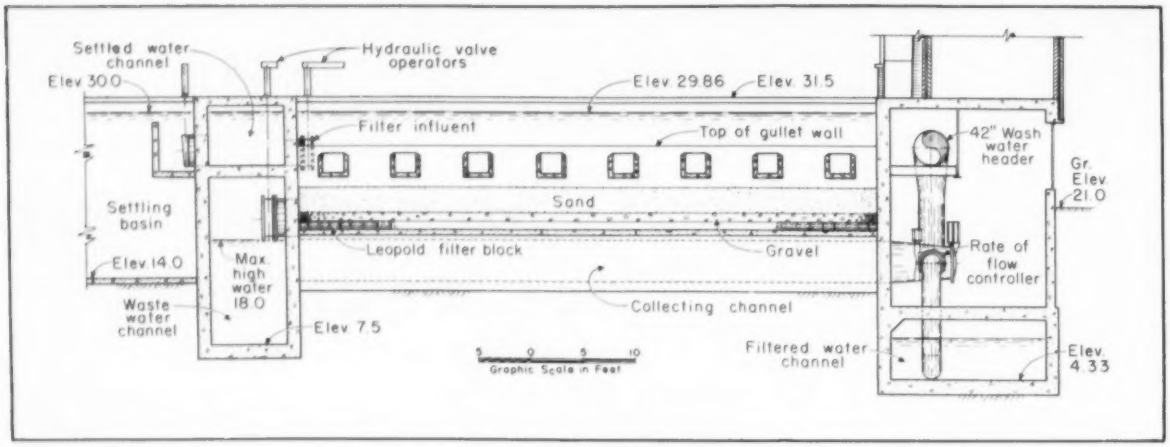
● **RECTANGULAR basins provide flocculation and settling. Filters are between settling basins and operating gallery. Laboratory is in building at the right rear.**

It is anticipated that the shallow reservoir will create problems of color, tastes, odor, and biological growths; otherwise, the run-of-river water is of excellent quality. It has an average hardness of 60 ppm and total solids of 230 ppm, mostly sodium chloride and bicarbonate. Average turbidity is 53. It is very low in iron. Raw water from Lake Houston will be pumped into a 14-mile, concrete-lined canal having a capacity of about 215 MGD, terminating at the purification plant in the heart of the industrial district.

The Purification Plant

The first unit of the purification plant is designed to supply the maximum 24-hour requirements of a system whose average daily demand is 50 million gallons. Ample space is available on the site for four such units. The anticipated ratio of peak-day to average-day demand in Houston's distribution system is 1.6, so that the maximum treatment rate required to supply the average demand, is 80 MGD. At this rate, the treatment works afford rapid-mixing for one minute; flocculation for 45 minutes; settling for 3½ hours; and filtration at 3.2 gpm per square foot of filter area. An allowance of four percent for filter outage and wash water is provided in the area of the filters. Hydraulics of the plant permit its operation at 100 MGD.

On the basis of pilot-plant studies, the basic treatment is estimated to consist of prechlorination at 4 ppm, coagulation with 2.2 gpg of aluminum sulfate, and stabilization with 0.75 gpg of lime. Supplementary chlorination may be applied before and after filtration and in the high-



● **TYPICAL section, Fig. 1, showing settling basin at left, filters in the center and operating gallery at the right.**

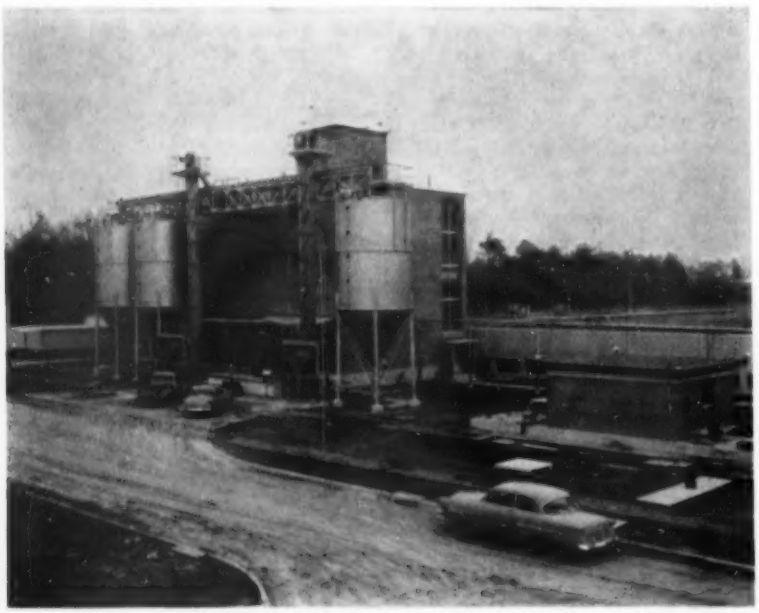
pressure distribution feeders. Activated carbon may be applied to the raw water, and if necessary in the future, directly on the filters.

Possibly the most interesting feature of this plant is its arrangement, which requires no product piping ahead of the filters. This is shown in Figure 2. Flocculation and settling are accomplished in three rectangular basins with common walls, having an overall width equal to the width of the 12 open filters. In effect, the end walls of the treatment basins and the filters are located seven feet apart, and the intervening space divided into an upper and lower chamber (Fig. 1). The upper chamber functions as an interconnecting channel between the treatment basins and filters, and the lower chamber as a wash-water sewer. Treated water is admitted from the interconnecting channel at the back of the filters and wash-water drainage is also discharged from that end. Separation of these facilities from the usual gallery piping leaves only the wash-water header, the treated-water flume, and the filter controls to be housed in a gallery 15 feet wide, with continuous windows on one side for the full length of the 12 filters.

The plant profile is established largely by the high-water elevation of Hunting Bayou, the receiving stream into which wash water is discharged. It will be seen in Figure 1 that the wash-water outlets from the filters are set above this high-water level. Raw-water pumps deliver water from the canal forebay to the treatment works, and since treated water storage is above ground, it is necessary to re-pump from the filters. Distribution pumps are located at ground level, under positive head from the above-ground storage.

Contrary to the manner in which many older plants have been arranged, it was found that a considerable saving in cost could be realized by not attempting to centralize all operating controls, but rather to locate each as closely as possible to the actual operation. Operating functions in the plant break down as follows: Quality control in the Laboratory; process control in the Chemical Building; production control in the Filter Gallery; and product delivery in the Distribution Pumping Station.

Coordination of these separated functions is effected by means of telephones, an intercom system with coded calls, and a comprehensive system of tele-metered information. Thus, for the Quality Control function, the administration building and laboratory are located at the main entrance to the plant site (Fig. 2). For Process Control, the chemical building, which is built to serve two 50-MGD plant units, is located at the northwest corner of the first unit, halfway between the main chemical application points of the first and second (future) plant units. Control of the raw-water pumps, the finished-water transfer pumps, and the filters (Production Control) is from the filter gallery, near the transfer pumps. The distribution pumping station (Product



● **CHEMICAL building features outdoor storage and conveyors, using steel bins. Activated carbon is stored and handled as a water slurry beneath track at right.**

● **PIPE gallery, top photo, showing butterfly valves and Dresser coupling to permit quick removal of valves.**

● **FEEDER floor in chemical control building. Manifold at right permits interchange of lime and chlorine feeds.**

● **Four 6000-lb. chlorinators, top, permit chlorine to be introduced at four different points in treatment process.**

● **INSTRUMENTS on central control panel carry colored symbols above showing measurement points and flow diagram.**

Delivery) is located at the southeast corner of the site to facilitate power service to the main substation, and for ease in routing of transmission pipe lines away from the plant.

Automatic controls relieve the operators of the need for most of the coordination between the production and process functions. The filter operator regulates the plant production to meet the daily demand of the system. Both the raw-water pumps and transfer pumps are under his control. It is unnecessary for him to change filter settings, for the filters automatically compensate for any changes in finished-water pumping rates, as well as for outage of filters and replacement of wash water.

The chemical feeders and chlorinators also compensate automatically for changes in the production rate. The chemical building attendant, having once set the proper feed rate into the feeders, can ignore changes in production rate, except insofar as it affects re-loading the feeders. The laboratory staff is relieved of the necessity of securing samples from various points throughout the plant; a continuous-flow sampling system delivers samples from seven points in the system, directly to the laboratory. All pertinent information relative to plant production, water quality, and deliveries to the distribution system is transmitted to a central instrument panel which provides the permanent chart records for the plant.

Raw water from the canal terminus is pumped to twin measuring flumes and two-stage rapid-mix units where chlorine, coagulant, and when necessary, carbon is added. Each of the three treatment basins is equipped with seven three-stage Jeffrey axial-flow flocculator units. The first half of the settling compartment of each basin is equipped with Dorr "Squarex" radial sludge collectors. There are 18 Rodney Hunt gates used in the plant for flow control.

The Filters

The filters are arranged in pairs, with asymmetric wash-water gullets on opposite sides of a common dividing wall. All but one of the filters are equipped with Leopold ceramic underdrains. One filter is equipped with Carborundum porous plate underdrains. Wash-water troughs are of precast, light-weight concrete. Silica sand, meeting AWWA "medium" specifications is used. All filters are equipped with Palmer rotary surface-wash units. Rate control is effected by direct-acting Simplex controllers, in which the rate-of-flow is modulated pneumatically so as to meet varying demands from the finished-water transfer pumps. This system automatically proportions the demand between all operating filters, up to

a maximum filter rate of 4 gpm per square foot of effective filter surface. Thus, when one or more filters are taken out of service for washing, the remaining filters automatically compensate for this loss in capacity, including replacement of wash water.

This is one of the first plants in the country to use rubber-lined butterfly valves in the filters—in fact, for all low-pressure service. These are S. Morgan Smith, "R-S" valves. The influent and wash-water waste valves are located directly in the filter gullet, and are operated pneumatically by horizontally-mounted cylinders, above the water level. The use of some 65 large butterfly valves in this plant resulted in a substantial reduction in space, and a direct, in-place cash saving, over conventional gate valves, of $124,000 on the basis of alternate bids. An electrically-operated butterfly valve is also used for control of wash-water rates.

All large piping throughout the plant is of welded steel, except buried lines, which are Lock-Joint concrete pipe. Interior of steel lines is protected by AWWA enamel coating, checked for holidays after erection, with high-tension flaw-detectors. The use of steel pipe affords much greater dimensional flexibility and is substantially cheaper in the large sizes. Considerable study was given to piping arrangements which would permit quick removal of valves for servicing. This was readily accomplished by the use of Dresser and Victaulic couplings, which are especially adaptable to steel piping.

In line with current industrial practice in the Gulf Coast area, a number of the plant components are unhoused. The raw-water pumps, the rapid-mix drives, and finished-water transfer pumps are in outdoor stations, and the steel storage bins for coagulant and lime, together with the bulk-handling systems are outdoors. Special care was given to the painting of the steel surfaces of these structures. Treated-water storage tanks are also of steel. This has been found to be cheaper than concrete in first cost, and requires only minor maintenance.

The use of Fairbanks-Morse vertical, mixed-flow pumps for raw-water and transfer service resulted in considerable saving in station costs. An adjacent station, equipped with multi-staged turbine pumps, will supply up to 75 MGD of raw water to industries.

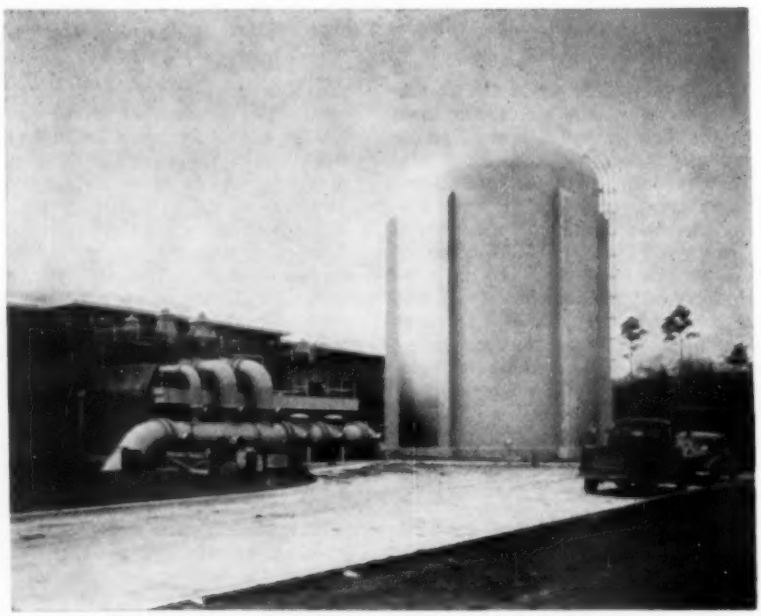
The use of colored "graphic panels" over the central instrument panel and the plant control panel is another innovation in waterworks practice. This is an adaptation from the petrochemical industry, in which a colored flow-diagram is installed over the operating panelboard with each instrument color-coded to the point on the flow diagram at which the measurement is taken. These panels are most helpful in familiarizing operators with the process and the controls, and is interesting to visitors. A similar panel, in which the operating controls are actually located on the diagram, is used to operate the Jeffrey bulk-handling equipment. This installation uses a single bucket-elevator, in conjunction with screw conveyors, to load the storage silos from railway cars, and also to load the feeders from the storage silos. Separate systems are provided for lime and coagulant handling, with a "cross-over" arrangement for alternate use of either system. The system is fully automatic and is protected from malfunction by a series of electric interlocks. The entire operation is indicated with lights on the graphic panel, including material levels in bins and storage silos. Equipment is also provided for mechanical unloading of bulk materials from box-cars, and for storage and handling of bagged materials.

Five Omega "Loss-in-Weight" dry feeders maintain the required dosage of coagulant and lime, automatically compensating for changes in plant production rates. Two feeders are for granular alum or other coagulant. A third is equipped to feed soda ash or sodium aluminate as well as alum. Two feeders for unslaked lime are equipped with slakers.

Chlorination equipment, housed in a separate room, consists of four 6000-pound Wallace & Tiernan pneumatic chlorinators. These are also equipped to maintain constant dosage regardless of changes in production rates. Chlorine residual cells are located at various points in the process, transmitting the measured residual to recording instruments on the chlorinator control panel and the central instrument panel. Chlorine in ton containers is stored in special sheds adjacent to the chemical building and fed in the liquid phase to electric evaporators in the chlorinator room.

Following the technique developed at Chicago's South District plant, activated carbon in bulk is stored and handled as a water slurry to eliminate the problems of fire and dust. Carbon in cars is unloaded directly into under-track concrete tanks, equipped with Link-belt mechanical and air agitators. Carbon slurry is measured by Omega "Roto-dip" feeders and pumped to points of application with Robbins & Myers "Moyno" pumps.

The location of the clear-well storage above ground makes it possible to situate the distribution pumps at ground level, eliminating the hazard of flooding. This station



● **FINISHED water transfer pump station, with outdoor pumps, butterfly valves and welded steel piping. The washwater tank and pumps are shown in rear center.**

is equipped with horizontal, bottom-suction, single-stage centrifugal pumps manufactured by Worthington. Operating against a design head of 250 feet, the four pumps initially installed deliver an aggregate of 45,000 gpm in units of 5,000, 10,000 and 15,000 gpm. Additional space is provided in the present building for three 30,000 gpm pumps. Operation of these pumps is from a small mezzanine room at crane-height at one end of the station from which the operator overlooks the main pump room. The pumps discharge through S. Morgan Smith cone check valves and individual venturi meters, into an outdoor steel discharge manifold suitably gated with conventional gate valves.

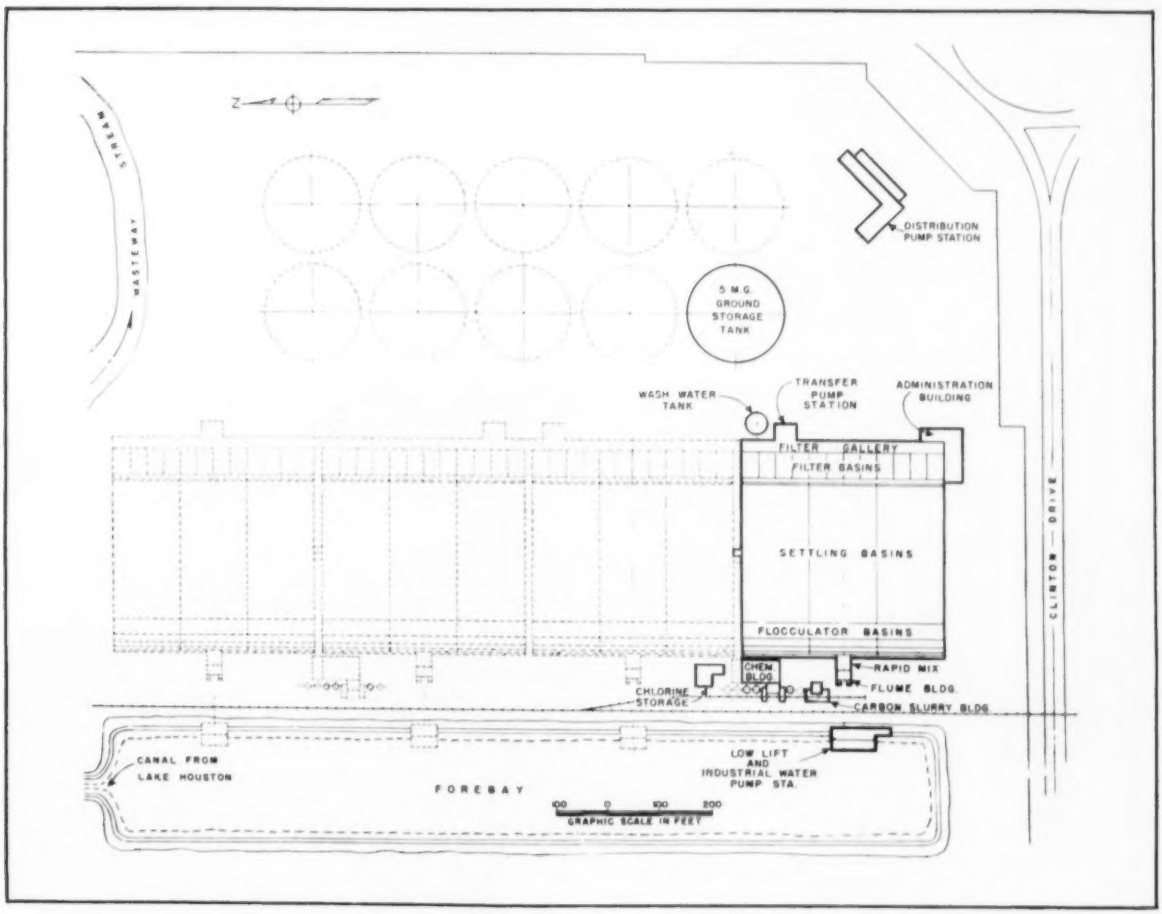
The main power substation is located immediately adjacent to the distribution pumping station. Primary power is received at 66 KV and reduced to 4160 volts in the main substation. Main switchgear is located in a wing of the station. Power to all motors over 200-HP is at 4160 volts, and to smaller motors 440 volts. The proximity of the plant to two of the power company's principal generating stations makes possible the use of cross-line starting equipment for all motors including the 2250-HP pump motors to be installed later.

The plant administration building is built integral with one end of the filter operating gallery. It is completely air conditioned and has windows of green heat-resistant glass. The first floor houses administrative offices, a classroom for operator training and men's locker rooms. With a bow to local custom, a small self-service "coffee bar" is provided, since the plant is located two miles from the nearest restaurant. The second floor houses the completely equipped main laboratory which performs all analytical and bacteriological work for the water division in addition to its plant control function. The central instrument panel and women's locker rooms are also located on the second floor. The basement houses a completely-equipped plant maintenance shop.

Advance planning and administration of the project was accomplished by the Utilities Department of the City of Houston, under the direction of Frank N. Baldwin, Director; W. K. Van Zandt is Assistant Director; and G. L. Fugate, Chief Design Engineer. Clyde R. Harvill is General Superintendent of the San Jacinto Water System and Sheldon A. Salisbury is Assistant Superintendent.

The design of the purification plant and pumping stations and the supervision of construction were by Freese, Nichols and Turner, Consulting Engineers, of Houston. R. M. Collie, recently made a partner in the firm, was project Engineer. Brown & Root, Inc. of Houston, were the construction contractors.

Construction of the plant began in March 1952, and was completed in early 1954. The total cost of the plant was $4,900,000, of which $385,000 is for separate raw water pumping equipment for industrial water.



●LAYOUT plan of Houston Plant, Fig. 2, showing forebay, settling basins, filters and the various control buildings.

Saving $150,000 a Year by Selling Waste Trees

EDWIN J. KNUDSEN

BY THEIR foresight in seeking and finding a market for Chicago's waste trees, public officials there are bringing in an estimated $150,000 this year to the city's treasury. Furthermore, it is expected by the officials that this annual figure will swell eventually to around $250,000 when operations get well under way.

This unique money-saving venture was the result of some enterprising inquiries made by City Purchasing Agent John F. Ward and City Parks Supt. Walter Wright when these officials sought better methods of waste tree disposal.

The fortunate move was occasioned by the pressing problem that Chicago has had to face in the past few years of ridding the city of thousands of hazardous and decaying cottonwood trees. Because of their rapid growth characteristics, the trees were planted extensively in Chicago's lawns and parkways by real estate operators some 40 or 50 years ago. Now the citizens, concerned both by the hazards of the old trees and by the ungainly appearance of this tree type, have flooded the city parks office with requests to remove the trees. Additional complaints arise from the tendency of the tree to consume exorbitant amounts of water and to extend its roots out in such a manner as to dislodge sewer pipes and uplift sidewalk slabs.

Handling Complaints

The procedure followed when a complaint reaches the city parks department starts with sending an inspector out to examine the specified tree. A careful file is kept of all such trees. If the condition of a tree warrants immediate felling, a crew of three men in addition to a foreman is sent to the site. The condemned tree is first topped of the smaller branches and the men then alternate in chopping the tree down to 6 ins. below ground level. The area is then covered with soil and seeded. McCulloch and Mall chain saws cut the fallen tree into sections for better placing in haul trucks.

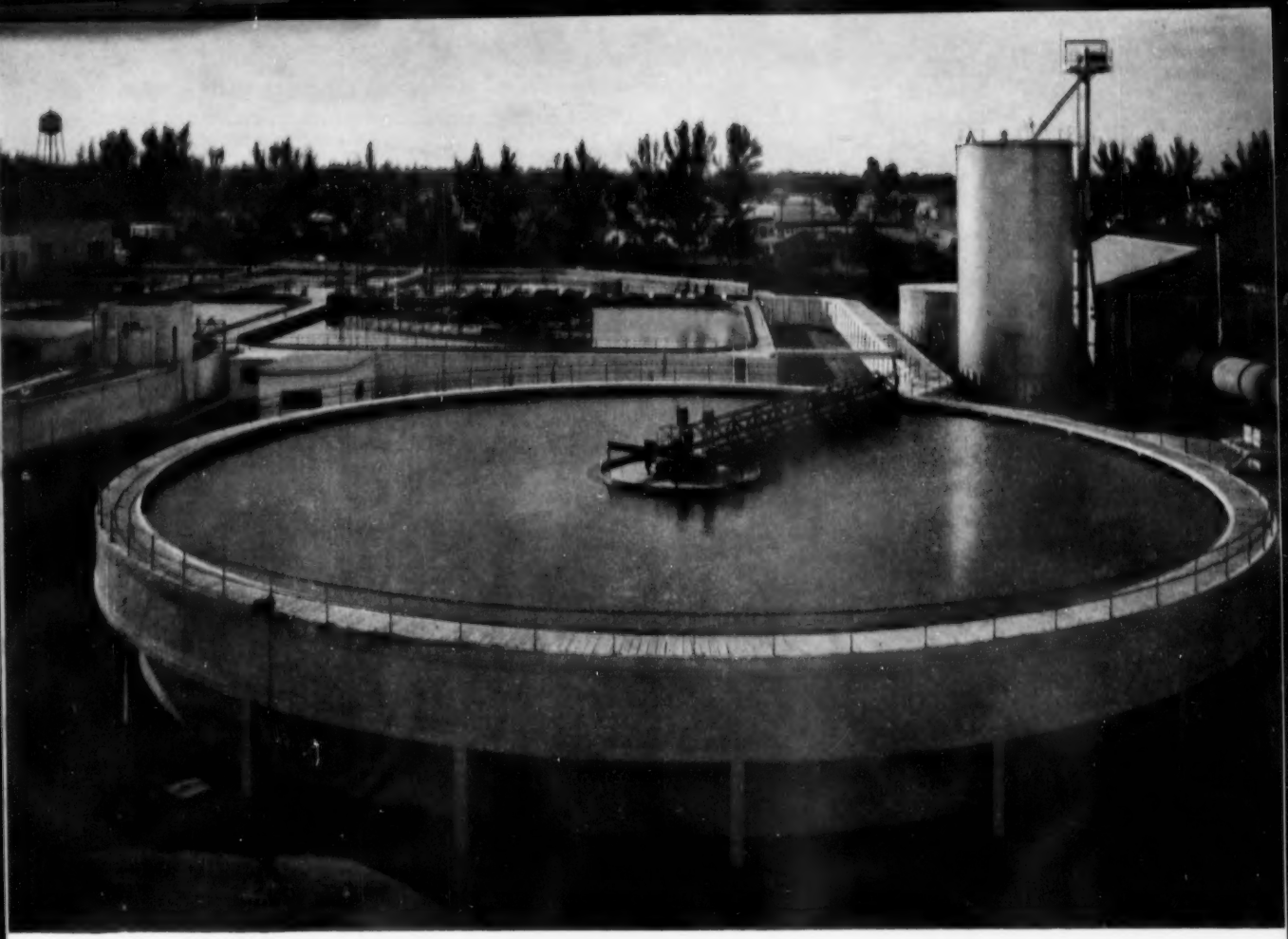
Presently 50 crews are engaged in cutting down 20,000 trees a year; this is to be increased to 30,000 per year as the program progresses.

Heretofore, these waste logs were hauled to dumps located at the outskirts of Chicago. Noting that these haul cycles were long and hence expensive, Purchasing Agent Ward and Supt. Wright looked about for possible sources of revenue from the waste logs. Their efforts were rewarded when the Forest Products Industries in Madison, Wis., suggested that the logs could be utilized in the manufacture of roofing felt for making asphalt shingles. A contract was let to the Edward Sider Processing Co., Joliet, Ill., the highest bidder, to purchase the logs for $2.10 per ton. The company also agreed to furnish the necessary machinery for processing. The $150,000 savings resulting from the new plan comes through $80,000 received from the sale of the logs and an additional $70,000 saved by reducing hauling distances.

Under the new program, the logs are hauled to the house of correction on Chicago's southwest side. A master chipper has been set up there for reducing the logs to the required chip sizes. Prison labor is used for unloading, stacking and cutting the logs to a 17-in. diameter —the maximum size that the chipper handles. About 100 prisoners are employed in the work; this number will be stepped up ultimately to 600 as the program advances.

To sum up, the new log selling program benefits in several ways: 1) It adds to the city's revenue by the sale of the logs; 2) it reduces the hazards due to falling and decayed trees; 3) it is ridding the city of an ungainly and destructive tree type; and 4) it provides work for idle prisoners.

● Crew topping 74-inch cottonwood tree and cutting it into sections with chain saws for hauling to the chipper.



Courtesy The Dorr Co.

● **COLOR photo of a portion of the Hialeah Water Treatment Plant, serving Miami, Florida.**

PUBLIC HEALTH FACTORS IN WATER PLANT Design, Construction & Operation

DWIGHT F. METZLER,
Chief Engineer and Director,
Division of Sanitation
Kansas State Board of Health.

PUBLIC health considerations govern many of the factors in the design of water purification facilities. Some of these considerations are well-known, while others are obscure and tend to be forgotten, particularly in the design of smaller water treatment plants, where the necessary individual study often cannot be given to the project.

While such factors as economy of construction and operation, structural security, and esthetic values are important in the planning of any water purification plant, the production of a pure, palatable product is the first consideration of the waterworks designer.

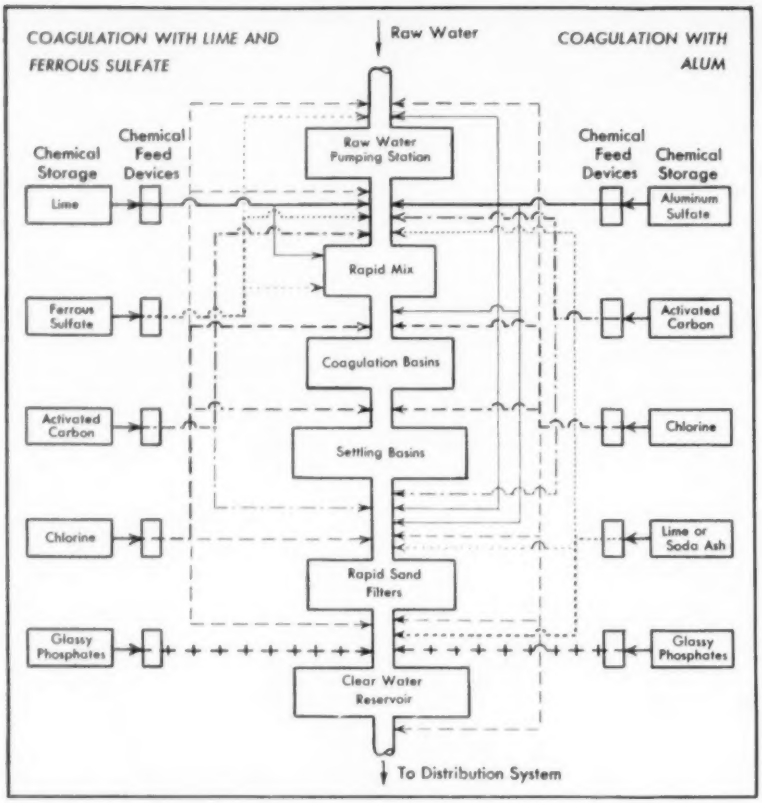
Every step in the water treatment process is concerned with some aspect of this goal, and the failure of a single one places the entire process in jeopardy. During each step in treatment the water must be protected against contamination, and the equipment should be so planned that it can be operated only in the manner intended.

In developing a source of water supply special attention is needed toward assuring its adequacy. Two major factors are at work to make a source of supply tend toward inadequacy. The first is the steady increase of users and a growing per capita consumption. The second is the unusual drouth which may occur once or twice a century, but which is not reflected in the two or three decades of record which often provide the basis of design. Conservative factors of safety are used in the structural design of the plant, while watershed yields, reser-

voir storage and loss from siltation are often combined to give much too optimistic conclusions. As this is written one Kansas community of 5000 with a water plant less than one year old finds itself completely out of water.

Site Selection—A site should be selected which is accessible and which permits future expansion. Special attention to protection against flooding and high ground water comes early in the project consideration. Location of the basins, filters and clear at least 2 ft. above the greatest flood of record is the absolute minimum safety factor to be considered, and 10 feet above such flood is highly desirable. In support of these figures, recent Ohio River and Kansas River floods reached crests up to 10 feet greater than any recorded previously in more than 100 years. In some cases where structures were not overtopped by the 1951 Kansas flood, the high ground water level from the flood caused equivalent damage.

Planning the Plant—Special attention given to planning a compact, well-integrated plant with the simplest possible devices for feeding and mixing the chemicals is rewarding, both to the designer and the community. In the design of small plants, less money is available for engineering studies and the period and reliability of records are likely not as great. For that reason greater factors of safety should usually be employed and more precautions taken to assure that treatment is adequate to meet emergencies which the period of record may not include. In some cases design can be adapted to topography to reduce the construction and operating costs, as in the location of a plant on a hillside permitting both the filters and the clear well to be built at ground level or nearly so.

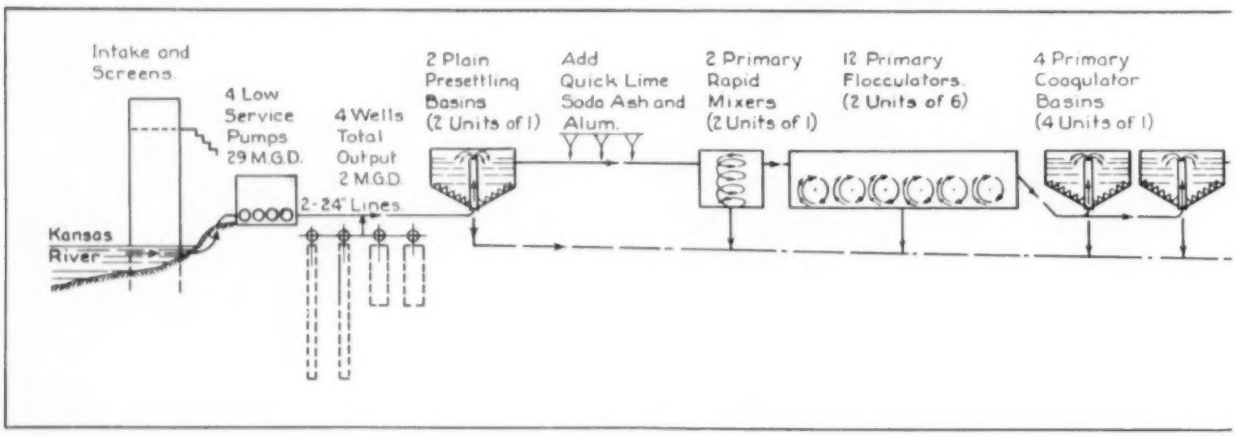


● **FLOW DIAGRAM for chemical treatment. Alternate points which are desirable for feeding chemicals under certain raw water conditions are shown by light linework.**

Attention is given in well-designed plants to the safety and convenience of the operating personnel. This is especially important in the "one operator" plants. Unnecessary lifting and hazardous operations such as might be created by exposed, narrow, unguarded walkways, which can be covered with ice, are to be avoided.

The plant capacity should exceed the maximum water use for the peak day of the year. Frequently it is economical to design small plants to produce this quantity in an 8 to 10-hour period since added

● **FLOW diagram of the Topeka, Kans., water treatment plant, shown below and on the next page, illustrates processes necessary for treating polluted water.**


Intake and Screens
4 Low Service Pumps 29 M.G.D.
4 Wells Total Output 2 M.G.D.
2-24" Lines
Kansas River
2 Plain Presettling Basins (2 Units of 1)
Add Quick Lime Soda Ash and Alum.
2 Primary Rapid Mixers (2 Units of 1)
12 Primary Flocculators (2 Units of 6)
4 Primary Coagulator Basins (4 Units of 1)

plant capacity is less expensive than personnel for 24-hour operation. When the maximum daily draft is approached, planning for plant additions should start. This condition would ordinarily occur within 20 to 25 years. Design for greater periods may penalize the community, denying it the use of advances in the science of water treatment.

Provision should be made in the design for auxiliary power, regardless of the apparent security of the regular power supply. Not a year has passed in Kansas, and doubtless conditions are not greatly different in other states, but tnat floods, winds, storms or strikes have left one or more cities without electric power. During the 1951 flood, 10 Kansas cities were out of water, completely for a time, because of power failure, and they were without safe water for an average of 11 days. The standby power may vary from pulleys geared to right angle drives, which will permit the use of farm tractors for small plants, to fully equipped diesel or gasoline power units for the larger plants.

Treatment Requirements

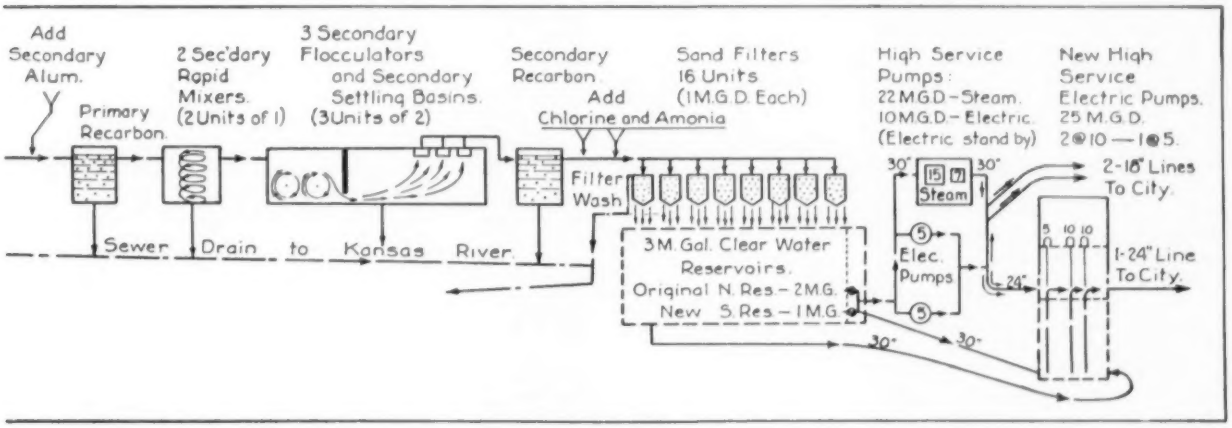
The treatment required is determined by the chemical, bacterial, physical and biological quality of the raw water. Other factors such as the type of operators available and variations in raw water quality should also be considered. Chlorine applied to safe ground water is especially desirable in conditioning water for domestic use. Chlorine, properly reinforced with other adequate treatment is a standard requirement for contaminated ground water and all surface water. Waters which are more heavily polluted, are high in color or turbidity, have a fluctuating or high chlorine demand or are averaging not more than 5000 coliforms per 100 ml. in any month may be treated by flocculation, sedimentation, rapid sand filtration and continuous post-chlorination.

● **EVEN A well-built levee failed to protect the Kansas City, Kans., water plant. Here volunteers are placing sand bag barricades around boils inside the dikes.**

The U. S. Public Health Service Drinking Water Standards establishes a monthly average of 5,000 coliforms per 100 ml. as the recommended maximum concentration of pollution which is permissible. Presedimentation or prechlorination is required where 20 to 35 percent of the samples in any month exceed 5,000 per 100 ml. In this case not more than 5 percent of the samples shall exceed 20,000 coliform organisms per 100 ml.

While these standards are desirable, and the designer would doubtless follow them if possible, the fact remains that some important water supply streams are more heavily polluted. Treatment along these streams by a combination of presedimentation and at least 30 minutes contact after prechlorination is a practical and safe practice. Reservoir storage of two weeks or longer also gives excellent coliform reduction and offers the advantages of permanence and reliability, although it may aggravate taste and odor problems. Either method will give more than 95 percent reduction in coliforms.

The chemical quality of the raw water may dictate certain treatment practices. For example, water having more than 100 to 120 ppm hardness can be economically softened. Turbidity greater than 10 ppm, or color in excess of 20 ppm, is objectionable and should be removed. Coagulation with alum is most effective for normal water temperatures and a pH of 6.75 to 7.4, while iron salts are best for lower water temperatures and either higher or lower pH values. The nitrate content of any proposed supply should be below 10 ppm, expressed as nitrogen, and the fluoride concentration should be below 2.0 ppm. Practical methods of fluoride removal have been developed for specific supplies, although the treatment required is relatively expensive. The occurrence of iron and maganese in concentrations greater than 0.3 ppm causes staining of laundry and fixtures, but more importantly it interferes with chlori-



nation. Treatment plants are frequently justified on the basis of iron removal alone.

In the preliminary studies leading to plant designs, particular attention should be given to the possible occurrence of tastes and odors. Taste and odor problems occur occasionally from any surface water supply, and the types and causes should be determined in advance. Chlorine dioxide treatment, the application of activated carbon, breakpoint chlornation at low pH values and chlorine-ammonia treatment after breakpoint are some of the methods which reduce tastes and odors.

Chlorination—Chlorination is almost universally depended upon for disinfection. In adddition it offers certain biological benefits including taste and odor control, slowing the decomposition of sludge in plain settling basins which lack sludge removal facilities, controlling algae in and along the sides of basins, abolishing growths in the filters with resulting increased length of filter runs, and eliminating growths in the water distribution system. Prechlorination improves coagulation of some raw waters, especially those containing iron.

The bactericidal efficiency of chlorination is markedly influenced by the pH and temperature of the water (1). Studies of Butterfield and others have shown that 0.05 ppm of chlorine produces 100 percent kill in one minute with water at pH 7.0, while 0.50 ppm for 60 minutes is required at pH 10.7. In other words, a change in pH from 7.0 to 10.7 increases the chlorine requirement 10 times and increases the time factor by 60. At temperatures of 36° to 41° F, more chlorine is required than at higher temperatures to accomplish the same kill. The effect of temperature is much greater at the higher pH ranges with three to four times as much chlorine required to obtain a kill at 36° to 41° as at 68° to 77° F.

All public water supplies should be chlorinated regardless of their purity at the source. The maintenance of free chlorine residuals in the distribution system protects against small sources of pollution introduced into the system. It further improves the sanitary quality of the water and increases the system's carrying capacity.

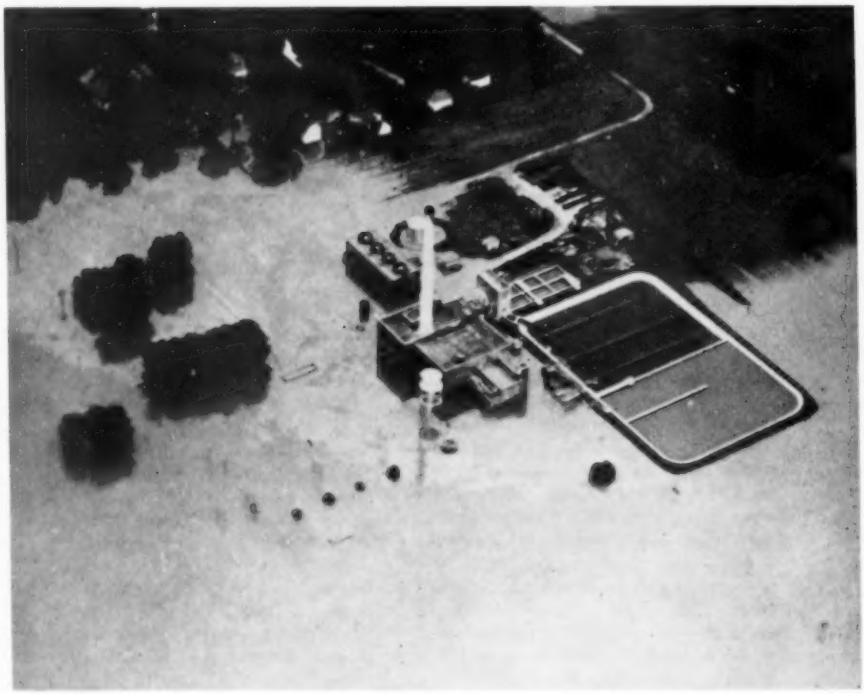
Simple chlorination is adequate for well waters and supplies from protected impoundments. In this case a minimum contact time of 30 minutes is advised before the water reaches the first consumer. An operating pressure ratio of 3:1 is recommended when the chlorine passes through an injector into a main under pressure.

Provision for both pre- and post-chlorination is necessary for plants treating turbid surface water. A pre-chlorine dose applied prior to the feeding of other chemicals, if possible at a pH of less than 7.5, is preferable because of its more rapid bactericidal action and its effectiveness in taste and odor control. For surface waters a chlorinator capacity up to 20 ppm is needed, and a capacity of three ppm plus the chlorine demand of the water is needed for ground water. Post-chlorination equipment should provide at least three ppm at the maximum rate of flow.

Duplicate chlorinators are needed to assure continuity of service, with scales and appropriate records to show the amount of chlorine applied. They may be housed in a separate room ventilated to the outside and above the surrounding grounds as a safeguard against accidents. Exhaust ducts should draw from the floor level, and a gas mask may be stored outside the chlorinator room. The canister type is suitable if the chlorine concentration in the air is below 1 per cent. Higher concentrations require a mask with a separate source of oxygen.

Chemical Feeding—To a considerable extent, the degree of purification is dependent upon the chemical feed equipment; therefore, dependability must have first consideration. Duplicate units are desirable even for small plants, and the feeder capacity should exceed the calculated maximum requirements by at least 50 percent. This additional capacity was a lifesaver at several Kansas plants during the 1951 flood, when chemical feed requirements jumped to previously unknown highs. The chemical feed lines need to be short with provision for daily cleaning. Open channels are advisable where they can be used, and cleanouts should be provided at each change in direction where the chemical solutions are carried in pipes.

Solution feeders have been used in many small plants even though they have certain disadvantages. They require more space, are difficult to service and tend to corrode; the orifices may clog when a low head is used. Their principal advantages are more precise feeding at low flows and assurance that all the chemicals are dissolved. All solution tanks should be equipped with float gages to record the level and drains to permit washing out accumulations of sludge. Tanks may be sized on the basis of feeding five



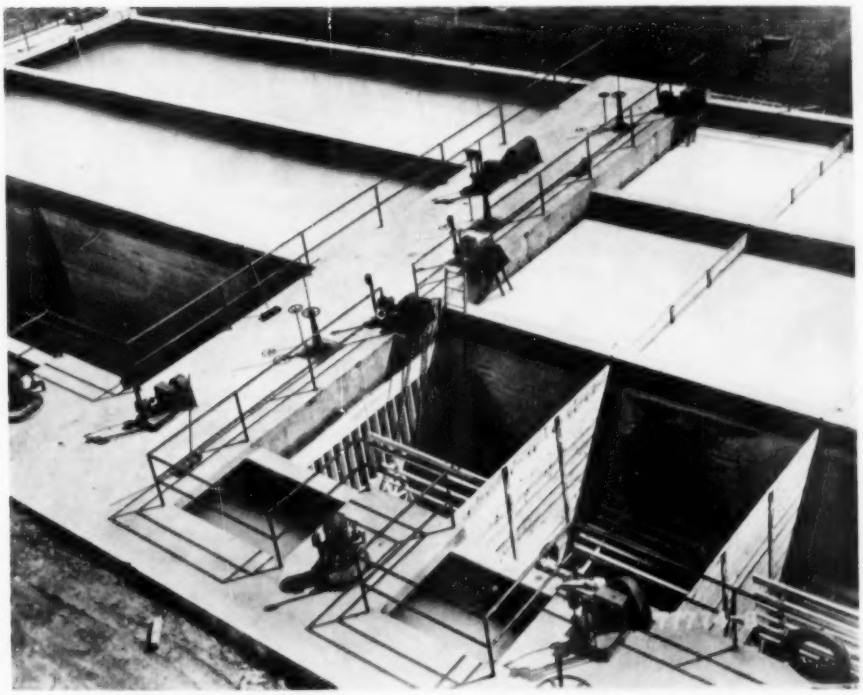
● **FLOOD water cracked the clear wells of the Ottawa, Kansas, water plant.**

percent solutions with sufficient capacity to run one full shift or one day, as the case may be. Where this type of equipment is chosen, special attention should be given to corrosion resistance, simplicity, dependability, and accuracy of feeding, such as can be obtained from displacement type chemical pumps.

Dry feed machines for chemical dosing are generally used in the medium-sized and larger plants. These are of two types—the gravimetric and the volumetric feeders. The former are best adapted to the feeding of chemicals of a non-uniform size or grading, or chemicals which vary from shipment to shipment. The volumetric feeders apply chemical by several means, such as a helical screw mechanism, revolving table, reciprocating table and vibrating trough. Since all of these principles are satisfactory, the choice of a feeder can be based upon simplicity and durability of construction, the positiveness of the feed and provisions for adjusting accurately the feed and measuring the chemical.

Regardless of the type of feeding equipment used, it should be carefully calibrated with the calibration charges posted in a convenient place for the operators. Since changes in water quality require prompt adjustments in feeding rates, the equipment which offers flexibility and ease of changing the feed rates should be selected. Some plants are designed to save labor and chemicals by regulating the rate of feed from flow meters. Any of the standard flow meters can be connected to the feeders by mechanical or electrical means.

Because of the nation-wide interest in fluoridation to control dental decay, a brief review of the requirements for feeding fluoride is in order. Conventional solution or dry feeders, such as are used for other chemicals in the water plant, are adequate. Where solution feeders are used, the fluoride should be applied to the discharge side of the pump to preclude the development of negative pressures. Feeders should be accurate within five percent, and there should be facilities for accurately weighing the amount of chemical used.



● **GOOD flocculating equipment is a first line of defense in water treatment.**

Recarbonation — Softening water by the lime-soda method produces an excess of normal carbonates of calcium and magnesium. To keep the water from depositing encrustants on the sand and scale in pipes, the normal carbonates are converted to bicarbonates by adding carbon dioxide. The reaction is immediate and a reaction time of five to ten minutes is ample.

That recarbonation is not considered as important by some designers as other parts of the water purification process is reflected in the frequent complaints of inadequate capacity from water plant personnel. Studies made recently by the Kansas State Board of Health show that as much as 350 pounds of CO_2 per million gallons of water may be required for softening plants concerned with calcium carbonate removal only. The high caustic alkalinity required for the precipitation of magnesium and, as sometimes used, to aid in removing fine turbidity, may require a capacity of 500 to 600 pounds of CO_2 per million gallons.

The compressor should be carefully sized, taking into account the percent carbon dioxide in the flue gas, the character of water treated and the amount of pH adjustment necessary to produce a stable water. In design and operation particular care should be given to proper venting, providing tight fitting manholes if the process is indoors, and obtaining the proper fuel-air ratio in the burners to eliminate the hazard from carbon monoxide. The new method of burning air and gas under pressure eliminates the need for scrubbers, avoids corrosion of the compressors and gives somewhat higher over-all efficiencies. Use of the water impingement system in breaking up gas bubbles has the advantage of permitting relatively large orifices in the laterals while retaining the small bubble size.

Flocculation and Settling

Low flocculation and sedimentation efficiency places an additional load on the filters, lowers the rates at which they can be operated and requires increased amounts of finished water for backwashing. This part of the process is responsible for removing not only most of the sediment load, but much of the bacterial load. Recent unpublished studies made at the University of Kansas indicate that this part of the water purification process is especially effective in the removal of fungi.

Rapid mix assures intimate mixing of chemicals and water and may be accomplished by high speed stirring devices or a hydraulic jump. Detention for the rapid mix is usually 30 to 60 seconds. Flocculation follows the flash mix and can be accomplished by a wide variety of stirring devices—horizontal paddles on vertical shaft or horizontal shaft and paddles have been standard, although there are many pat-

ented devices. In general these mixers should move with a velocity of 1.0 to 1.5 ft./second. However, variable speed devices to permit a range of 0.5 to 2.0 is helpful to the plant operator who must adjust the treatment to greatly varying raw water quality. The floc may be expected to settle at velocities less than 0.3 ft./second and will be broken up at velocities exceeding 2.5 ft./second.

Where highly turbid or flashy waters are encountered, presedimentation basins prior to the addition of chemicals will remove a large part of the suspended solids. They permit substantial economies through savings in chemicals, and reduce the necessity for frequent changes in chemical dosages. Their most important function from the standpoint of sanitary quality is to reduce the bacterial content of heavily polluted waters. Turbidities in the Missouri River and its tributaries exceed 8000 ppm two percent of the time with values of 15,000 ppm or more occurring every year. Presedimentation basins with mechanical sludge removal, a 1000-gallon per sq. ft. per day overflow and three hours detention at the maximum daily rate will consistently keep effluent turbidities well below 1000 ppm and most of the time below 400 ppm for the types of suspended material found in midwestern streams.

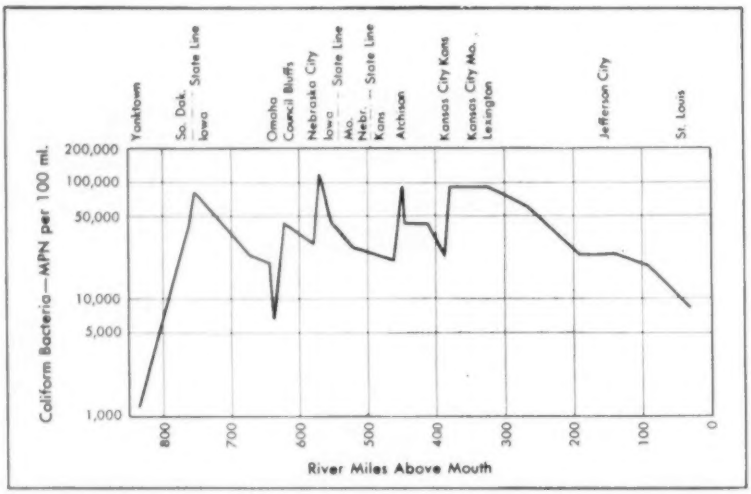
That human fecal pollution of many large river systems has increased markedly is established, and appropriate steps must be taken to assure that this additional pollution is removed. For example, the average coliform pollution at the Kansas City, Kansas, water plant has climbed steadily from 6,000 to 75,100 per 100 ml. in the past thirty years. Faced with the necessity for using this quality of raw water, the waterworks designer must erect additional barriers against a possible breakdown of the water purification process. Presedimentation, with its consistent reductions of 60 to 75 percent of the coliforms, is one of these safeguards.

To assure a uniform quality of water going to the filters provision should be made for feeding activated silica at times when coagulation with alum or the ferric salts fails to produce a settled water of the highest quality. This is especially important for plants whose raw water is subject to wide variances in chemical quality. Careful control of the coagulation process permits higher filter rates with the resulting economies.

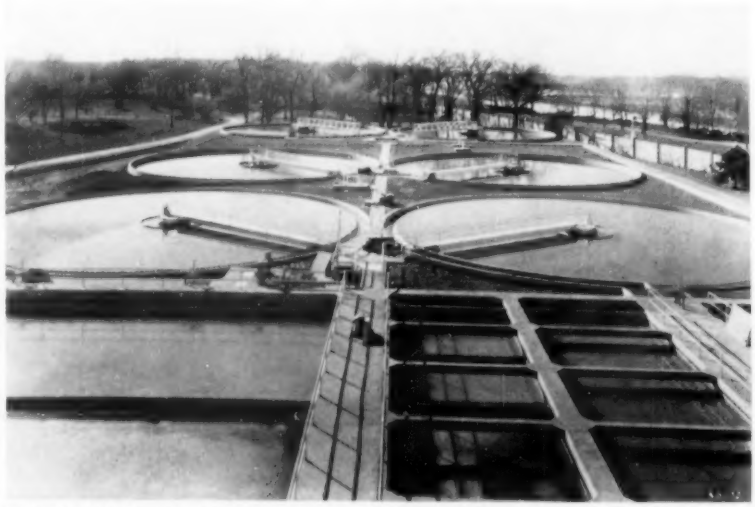
Culp and Stoltenberg (2) found that activated silica is somewhat more effective than other coagulants in water containing 4 ppm or more of detergents. The detergents interfere with sedimentation and coagulated material floats instead of settling. Very preliminary information indicates that detergents in the amount of 3 to 4 ppm may reduce sedimentation efficiency 10 to 20 percent. With the average annual consumption estimated at 7 pounds per capita, the designer should predict adverse effects on sedimentation at times of minimum stream flow, and size the basins accordingly.

The lack of efficiency and poor performance of some conventionally designed settling tanks has often been the cause of disappointment. Failure of tanks to function in accordance with general theory has been due to irregularity of flow caused by inlet turbulence, density currents from changes in temperature, fluctuations in sediment loads, interference by baffles and stirring caused by wind and sludge removal mechanisms.

The kinetic energy of water flowing into a basin is large in comparison to the potential energy lost by the particles settling out of the water. For this reason the inlet energy must be eliminated with a medium amount of turbulence. Inlets through ports followed by diffusion or lattice baffles with vertical slots are frequently used. Such a baffle best serves its purpose 5 to



● **AVERAGE coliform density, Missouri River water plant intakes, as of 1950.**



● **PART OF the Topeka water plant, with presettling basins in rear, and four primary clarifiers in middle foreground. Secondary flocculators in foreground.**

10 feet from the inlet, so arranged to give a flow velocity of 0.5 to 0.8 feet per second through the slots. Openings through the baffle may represent 5 to 7 percent of the cross-sectional area of the basin. Even this arrangement has limitations which should be recognized, for the streams of water which pass through the ports and slots extend into the sedimentation zone an appreciable distance. For this reason designing engineers and the regulatory agencies usually add capacity to sedimentation basins for damping the turbulence of the inflow.

A length-to-width ratio for rectangular basins of three to one or greater is preferable. Weir loadings for iron and manganese removal or the softening of well water may reach 15,000 gals./foot of weir crest per day, and surface loadings should be kept under 2200 gals. per sq. ft/day. The use of multiple weirs to reduce overflow rates has done much to increase the efficiency of settling basins. Thomas and Dallas (3) have proposed a radically sloped-bottom tank with multiple weirs which should provide higher efficiencies at lower construction costs. The sloped bottom reduces the tank volume without decreasing the tank surface and gives a theoretical uniform velocity throughout the length of the basin. At the same time it makes sludge removal easier and decreases the effect of density currents.

Surface waters needing both clarification and softening require a minimum of 4 to 6 hours of settling. An overflow rate of 600 gals./sq. ft./day and a weir loading of 10,000 gals./ft./day are maximum for this kind of treatment.

Suspended solids contact basins in which the multiple processes of mixing, coagulation and sedimentation take place in a single tank, are available. They have many applications, the most successful of which is for softening calcium bicarbonate well water. Treatment which involves a light or fragile floc, variable water flows, changing raw water quality, or the removal of more than 100 ppm of turbidity poses special problems which require individual study. The trend for several years has been toward more conservative capacity and loading figures. The engineer who considers the use of a solids contact basin has an important responsibility to determine that the unit is correctly sized and designed for the specific application.

For treating water as turbid and polluted as that in the Missouri River, for example, rise rates of 0.5 gal./sq. ft. of surface area per minute or less are needed, with detentions of at least two to three hours. With from 1 to 1½ hours detention and a rising rate of 1.5 gals./sq. ft., most solids contact basins give good results on softening predominantly calcium bicarbonate well waters. If magnesium is present, however, this rate must be reduced about 35 percent.

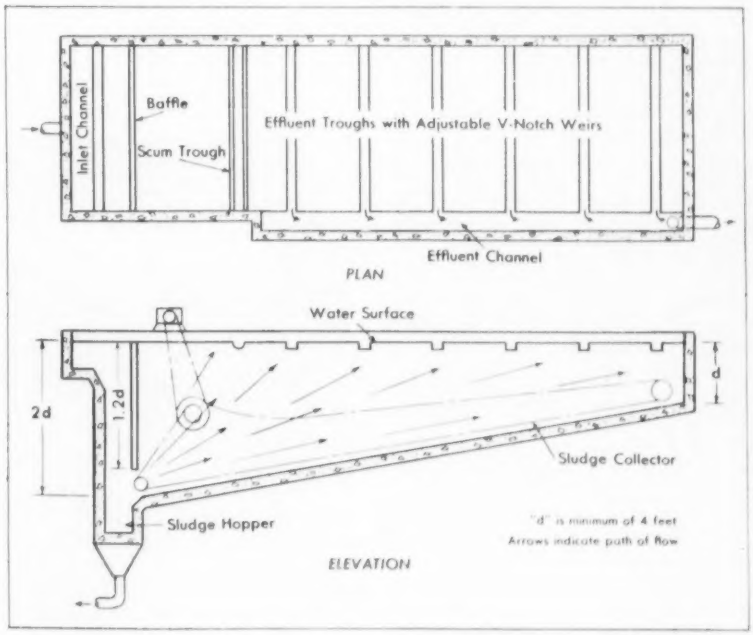
Filtration

Filters remain the heart of the water purification process, and their careful design will result in a safe water, with reduced wash water requirements and less effort on the part of the operating personnel. One of the keys to filter design is the underdrain system. Perforated laterals from a cast iron header have given good service for many years. In some cases Wagner blocks take the place of the coarse gravel layer. Orifices are alternately spaced 45 degrees from the vertical and arranged to give a relatively large head loss, 8 to 10 feet, in order to accomplish equal distribution of the washwater. By keeping the head loss through the orifices large in comparison to the loss through the sand and gravel, variations through the filtering media become relatively unimportant. This is a major factor in satisfactory filter operation since the majority of filter failures are caused by unequal distribution of washwater.

Wheeler filter bottoms discharge washwater upward through inverted cones filled with spheres to break up the velocity and give uniform distribution. They do this very effectively, but require 20 to 24 inches more depth than perforated laterals or Leopold blocks, which consist of glazed tile through which the water is carried. The orifice discharges upward into the filter media and various fittings have been developed to break the velocity and disperse the upward flow of water. A porous plate filter bottom supported by bolts anchored into the concrete floor to form a false chamber some 12 inches in depth is also used.

Careful attention to the choice of gravel to support the sand is needed to assure that it will not be displaced by backwashing. This characteristic can be checked while the filter is being built by backwashing the gravel before the sand is placed. If the gravel moves under these conditions, it will move after the sand is in place. The gravel layer is generally 18 to 24 in. deep with gradations from 1/16 to 1½ inches with each size carefully placed in a layer to support the finer layer above it.

Better preparation of the water applied to the filters has permitted a general increase in filtration rates. The 2 gpm per sq. ft. rate which was established 50 years ago has been increased to 3 gpm at numerous plants treating surface water, and to 4 gpm in plants softening well water, without reducing treated



● **SLOPED-bottom tank (see text on this page), showing construction details.**

water quality. This is a reasonable trend since, with the type of pretreatment possible today, the water applied to the filter is generally below 10 ppm in turbidity and usually of zero coliform content. In addition the water is chemically stable so that the characteristics of the filtering media are not changed by "growing", and improved filter practice has eliminated mud balls and filter shrinking. In some cases, particularly at small plants where skilled operators will not be in charge, the 2 gpm design rate should still be used even though the higher rates offer opportunity to decrease the plant construction costs by 4 to 6 percent. Sand for the higher rates varies from 0.5 to 0.7 mm effective size as compared to 0.4 to 0.5 for the 2 gpm rate with a usual uniformity coefficient of 1.25 to 2.0.

The hydraulic design of filters for 5 to 6 gpm per sq. ft. rates is advisable, particularly in view of the present practice of increasing filter loadings. The loading limitations at some of the older existing plants have been established by the hydraulic capacity of the filter system rather than by treatment limitations of the filter media.

Wash water troughs are made a variety of shapes and of numerous materials which might lead to the conclusion that the English practice of eliminating them in favor of collecting washwater over weirs into the main collector or gulley is sound.

Washwater may be supplied either by a separate elevated tank or by backwash pumps which take suction from the clear well. Following the 1951 flood, washwater in an elevated tank would have been welcomed at plants which were inundated. Where there were no elevated tanks, the sand filters had to be cleared by hand.

About 2 percent of the water produced will be needed for backwashing. Rates are from 15 to 20 gpm per sq. ft. with little difference between filters which are operated at the 2 gpm rate and those at the 3 gpm rate, assuming use of the same filters. Sand with a larger effective size increases the length of filter runs and decreases the amount of washwater needed.

The capacity of the washwater tank is determined by the size of a single filter unit. While there is considerable variation in actual practice, 75,000 gallons storage for each million gallons capacity (360 sq. ft.) is generally adequate. While some washwater tanks are designed to be filled through a pressure-reducing valve directly from the water distribution system, this arrangement is not as economical as pumping directly to the tank from the clear well though it does reduce the initial cost. The tank is located as close to the filters as possible with its bottom 20 to 40 feet above the sand surface. A recording meter operating either from a venturi or an orifice inserted between the pipe joints is desirable to record the rate and amount of water used.

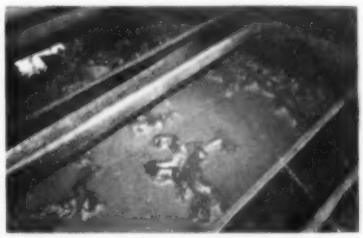
Surface washing of the sand while it is being backwashed produces cleaner sand with less water and has practically eliminated mud balls from filters. Surface washers of the Palmer type have been increasing in use. Their small water requirement and simplicity of use have been major factors in their acceptance. Older plants without this equipment may use fire nozzles to wash the sand surface.

Rate controllers permit automatic control of the speed with which water passes through the filters. The Venturi types of rate controllers are used as supplied by Builders-Providence, Inc., Simplex Valve and Meter Co. and Infilco.

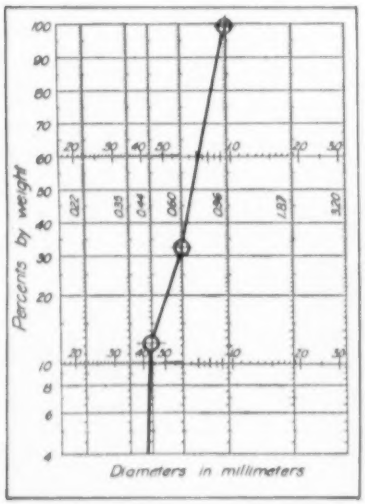
Miscellaneous Sanitary Hazards

In designing the plant, care should be taken to assure that non-potable and finished waters are separated by more than a common wall. Filter to waste connections are no longer necessary because of better facilities for getting the filters clean by backwashing. Their elimination removes the hazard which is present in many older plants of a clogged plant sewer forcing contaminated water into the clear well. If provisions for filtering to waste are needed, as in a plant where large amounts of activated carbon are fed to control taste and odors, an air gap should be provided as in the Lawrence, Kansas plant.

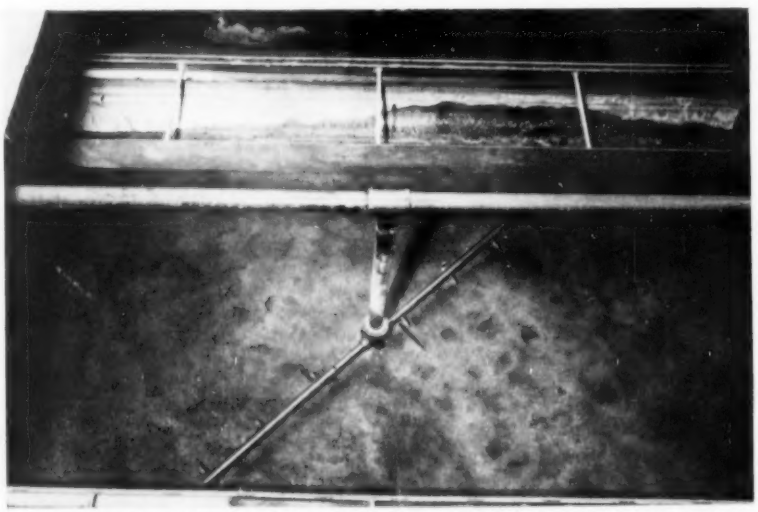
Clear well drains to sewers are usually not permitted by health authorities, nor should there be any



● **FILTER without surface washing is apt to look dirty, like this one.**



● **SAND analysis plot for determining size characteristics for filter sand.**



● **SURFACE washing keeps sand clean, uses less water, eliminates mud balls.**

physical connection between the finished water and that which is raw or partially treated. A few years ago the clear well at a Kansas town of 10,000 was connected to a plant drain. The drain clogged, its contents flowed into the clear well, and muddy water was in town before it was noticed. Fortunately the sanitary sewage and the washwater were carried in separate drain lines, and there was no disease outbreak.

Water-tight covers, such as a concrete slab, are desirable for all clear wells and other structures for storing treated water. Access is through a curbed manhole with overlapping cover secured by a hasp and lock. Vents terminate in an inverted U at least 12 inches above the ground or roof slab and are covered with ⅛-inch hail screen; in the event insects are expected to be a problem, small mesh copper screen is used.

Care should be taken in the design to assure that raw or partially treated water is separated from finished water lines. The one exception is in a well water treatment plant where the chlorinated water can bypass the plant and be pumped directly into the system. Other physical connections to be avoided include the priming of finished water pumps with raw water, and the priming of raw water pumps with finished water. Laying water lines in a separate trench or excavation from sewers and drain lines is a necessary public health precaution, and sanitary sewage should leave the plant in separate lines from the waste washwater.

Pumping stations located in or near the flood plain should be designed to withstand the hydrostatic pressure caused by floods. The 1951 flood very nearly left Kansas City, Mo., without water because of structural damage to a pumping station from hydrostatic pressure. Other cities were not so fortunate; their pumping stations failed.

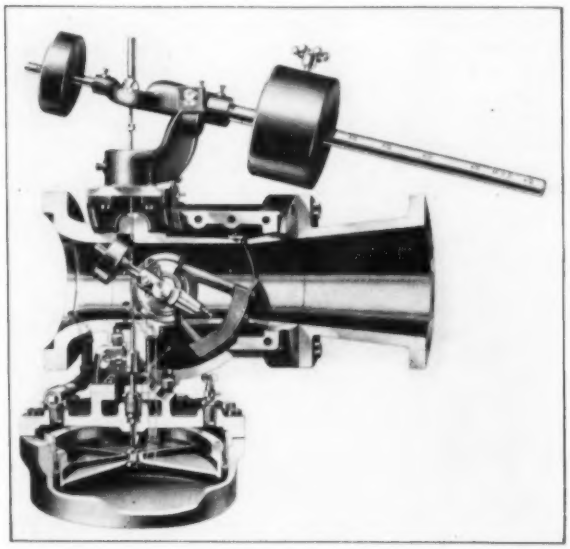
The same rules with respect to sources of pollution as are used in the location of wells apply to placing clear water reservoirs. The reservoir is frequently under the filters, but it should not extend under the filter gallery. While it was frequently the practice in the older plants to carry sewers or untreated water lines through the clear well, modern design practice is to discourage this arrangement.

Precautions During Construction

The chief precautions to be taken during construction include those designed to protect the existing water system, if additions are being made to a facility; and of course it is necessary that all parts of the new construction be arranged to exclude contamination from the finished water. The hazards are often greater than is realized when plant additions are being made. Existing facilities may be overloaded, pressure is taken off lines which normally are under positive head, normal operating pressures throughout the system may fluctuate widely, and pumps may start and stop frequently as they pump against direct pressure without elevated storage while repairs or additions are made. It is during times such as these that a breakdown in the water purification process is most likely to occur, or that contaminated water is most likely to find its way into the finished product through a cross-section. Particular attention to the purification process with increased sampling of the water during this period is justified.

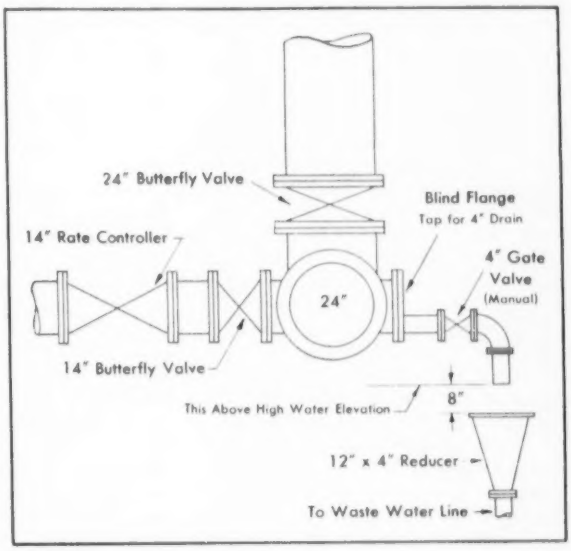
During construction particular care is required to assure that the completed basins, flumes and pipes exclude contaminated water. Defective, damaged or unsound cast iron pipe may be found by ringing each section of pipe with a hammer as it is suspended over the trench. Pipe and fittings should be handled in such a fashion as to assure installation in a sound, undamaged and clean condition. Care is needed to see that the full length of the pipe barrel is bedded, with recesses provided to accommodate bells and joints. Particular attention to this detail is recommended for cement-asbestos pipe.

The pipe interior should be swabbed clean and every effort made to keep it clean during the laying process. When the work is not in actual progress, the open ends of the pipe and fittings are securely closed to prevent the entrance of trench water, earth or other material. Pipe is best laid under favorable weather conditions, and water



Courtesy Builders

● **FILTER rate controller, showing actuating mechanism.**



● **AIR GAP construction prevents back-siphonage danger.**

should be kept out of the trench until the joint is completed.

Contractors' crews and municipal employees are too frequently guilty of careless handling of pipe before and during its laying. Recently a water main was being laid through an area where the sewage disposal needs are inadequately met by septic tanks. Septic tank drainage flows in the ditches along the roads and streets. The sections of pipe had been unloaded into the roadside ditch where they served as a conduit for the settled sewage until they were laid several weeks later. Suggestions for keeping the pipe clean before it is laid and for disinfection after it is in place are given in "A Procedure for Disinfecting Water Mains" in the February, 1948, issue of the Journal of the AWWA.

Hemp or braided cotton for joint packing may be sterilized with live steam or by 24-hour immersion in a 400-ppm solution of chlorine. After sterilization it should be kept in a closed container and removed only as needed for installation. Workmen handling it should wear clean, dry cotton gloves to avoid contamination.

When connections are made to existing water systems, contamination can be avoided by eliminating muddy water from the trench and by the liberal use of calcium hypochlorite in each joint of pipe and each new fitting. The new section should be flushed clean by water from the existing system, taking care that no contaminated water backflows into the existing system.

Before backfilling commences, the pipe should be tested at 50 psi in excess of the normal static pressure. When all joints are found to be tight at this pressure, the test can be stopped and backfilling commenced.

Before it is placed in service, each pipeline should be flushed, sterilized, and reflushed. The sterilization process consists of introducing 100 ppm of chlorine solution into the line and providing at least 8 hours contact. If at the end of the test at least 25 ppm residual does not exist, the process should be repeated. At the end of the test the chlorinated water is flushed from the system.

Care should be taken to assure that pipes will not be immersed in sewage during the laying process or after the trench is backfilled. Frequently a sewer is encased in at least six inches of concrete ten feet each way from a line crossing when the water pipe is below or less than two feet above the sewer. Cast iron pipe with leaded joints is sometimes substituted for the vitrified clay sewer pipe on both sides of the crossing. In excavating around the sewer, special attention to protecting the sewer line from damage is warranted.

New structures to contain treated water are flushed clean, scrubbed with a stiff brush in clear water, scrubbed in a one percent solution of chlorine and flushed again. Special care is needed in the construction of elevated tanks to assure that no waste matter is deposited in the tank during construction and that the interior is cleaned and sterilized before the tank is used.

Protection of the safety of the workers is important in a project designed to provide safe, pure water to consumers. There are many opportunities for accidents on any construction project. Some of the most frequent, yet preventable, occur in trenches. These can generally be prevented by shoring trenches four feet or more in depth when the material is granular, saturated or unstable. Bracing and shoring should be carried along with the excavation, and ladders are needed at regular intervals for trenches over five feet deep. Excavated material in all cases should be kept at least one foot from the edge of the trench.

Keeping the Plant and System Hazard Free

No matter how carefully the water plant has been planned, and regardless of the skill of the contractor who built it, efforts are for naught if conscientious trained personnel are not provided to make it function. Thus the plant operators have a special responsibility to prepare the water so it is safe both when it leaves the treatment plant and when it reaches the consumer.

Volumes have been written and spoken about the purification of water. As is apparent from the preceding pages, much study has been given to, and constant improvements have been made in, the water purification processes. However, much less attention has been given to the need for skilled operation of the water purification equipment, and to the need for keeping the water in a safe condition as it passes through the pipes to the consumer. In addition the literature contains relatively little advice to the water superintendent interested in preventing chemical or physical deterioration of the water as it is pumped to the consumer. This is the case even though some 60 to 70 percent of the city waterworks investment is in its distribution system.

It is significant that nearly all of the waterborne outbreaks involving public water supplies in the United States and Canada have been caused by operational failure, by cross-connections or by other means which rendered once-pure water unsafe after it was in the distribution system. In discussing waterborne outbreaks in the United States and Canada, Wolman and Gorman state "The most disconcerting feature of this entire study of waterborne outbreaks was the large number of outbreaks and cases of illness reported from communities where water purification plants have been provided which were not properly operated." That a great majority of the outbreaks were caused by the inattention of operating personnel or by contamination of purified water in the distribution system, points out the importance of a periodic evaluation, not only to see that the plant is properly operated, but to determine if all possible measures have been taken to protect the distribution system.

It is significant that outbreaks occur most frequently in cities under 5,000 population. Further, one cannot assume that water distributed from wells is automatically safe, for 30% of the outbreaks have occurred where the water supply comes from underground sources.

In analyzing waterborne outbreaks for 1938-45, Eliassen and Cummings (4) point out that there were six times as many cases of disease from untreated ground water as from untreated surface water. Inadequate control of filtration and allied processes was an even more important factor in disease outbreaks. Inadequate chlorination or failure of chlorination equipment was established as the cause of over 7,100 cases of typhoid, dysentery and gastroenteritis during the 7-year period. In every case the plant was adequately designed; the failure was a human one. This emphasizes the need for having technically trained, responsible persons in charge of water purification.

The amount of laboratory control and the number of records kept will be determined by the size of the plant and the character of the raw water. Minimum requirements will include a report of the condition of the raw water, the quantities of chemicals used, and the amount of water treated. The laboratory data

should measure the effectiveness of the purification process and record the bacterial, chemical and physical quality of the finished product. The minimum laboratory tests for surface water plants should include jar tests for coagulation, turbidity, alkalinity, pH, residual chlorine, fluorides if a fluoride compound is being fed, and coliform determinations. These determinations should be performed daily, and more frequently for the large plants or in the case of quality changes in the raw water. Special tests may be needed for some waters, such as for those containing iron or manganese. In the case of surface water, tests for residual chlorine should be made at each major step in the treatment. The frequency of these tests, along with determinations of turbidity and alkalinity, may be made as frequently as once an hour when the character of the water is changing rapidly.

A constant recording of water pressures and of the quantities of water pumped is recommended. The chemicals used should be recorded for every shift or day, and in the case of chlorine and fluorides, these quantities should be checked regularly against the residual in the finished water. More than once records of this kind have kept a public waterworks from being unjustly accused of causing an intestinal disease outbreak.

Constant vigil should be kept to assure that the plant has adequate capacity at the time of peak demands. The expansion of plant capacity often requires several years, and many city governing bodies have been thankful for alert waterworks personnel who called their timely attention to the need for plant expansion. Care should be taken to assure that the failure of a single unit, pipeline or valve, will not throw the entire plant out of service, and if auxiliary power has not been provided at the low service and high service pumping stations and at the treatment plant, steps should be taken to correct this.

● **NEAT and attractive, the new 1 MGD water treatment plant for Garnett, Kansas, is an excellent example of a compactly arranged and flexible plant.**

Attention to the distribution system is particularly important, for once the water leaves the plant it is beyond the reach of any corrective measures. Thus the water department must take advantage of every facility at its command to keep the water in the distribution system pure. This may be done by: (1) keeping a constant pressure on the distribution system, guarding against leaks and taking special precautions against contamination when the mains are opened for any reason; (2) taking every precaution against pollution on the premises of the consumer through cross-connections or interconnections to the public system; and (3) initiating a regular sampling program over the distribution system. The most effective programs are those where regular points are sampled routinely. These points should be scattered throughout the system with particular attention to industrial areas, overloaded sections of the distribution system and the residential parts of the community. Page 104 shows the minimum number of samples to be collected from the distribution system monthly, as recommended by the U. S. Public Health Service Drinking Water Standards.

A drop in water pressures with underground leaks offers a serious health problem, as do frequent surges caused by changes in water pressure. While water is supposed to flow from the source of supply to the consumer, leaks, breaks and reduced pressure may cause it to flow in the opposite direction. When it does, it may carry used or polluted water with it from a water closet or an industrial process.

It is common practice, particularly where shallow ground water is plentiful, for industries, commercial establishments and homes to connect both the public water supply and an auxiliary supply to their systems. This happens even though the auxiliary supply is obtained through inadequately constructed, improperly located wells. Water department employees can be of special assistance to new customers when the water service is being extended if they will check the consumer premises and be sure that a connection between the two supplies is not planned. This is the best time to eliminate potential cross-connections. In addition, periodic inspections should be made of premises where hazards are likely to eixst to be sure that an unsafe connection has not been made. In cities with regular plumbing inspectors, such a program can largely be the plumbing inspector's responsibility. In cities lacking this service the elimination of cross-connections falls squarely upon the water department.

At Newton, Kansas, in 1942, Kansas experienced its only large waterborne epidemic. Nearly 3,000 of the city's 10,000 residents contracted bacillary dysentery, and a preliminary investigation indicated that it was probably waterborne because of its uniform distribution throughout the city. Many interconnections between the public water supply and the sewer were found, and it was only by accident that State Board of Health engineers, working with the Public Health Service, were able to identify the specific

connection which was responsible. Among the hazards were: air conditioning units carrying city water discharged directly into sewers; wells immediately adjacent to leaking sewers were separated from the city water system by a single valve; and the piping in some industries provided a direct route for the sewage to enter the water lines. The outbreak was caused by the flow of sewage through a cross-connection into a water line which was drained to permit repairs.

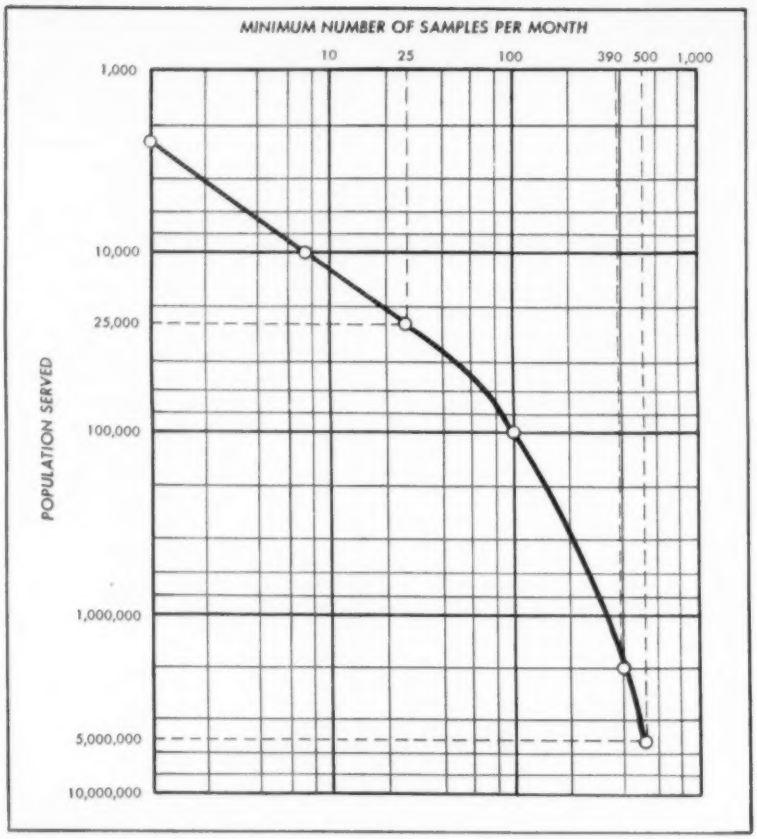
Every effort expended to eliminate main breaks will add to the public health protection, for each such break offers an opportunity for contaminated water to enter the main, or for the draining of the building's plumbing to pull contamination into the system.

Chlorine demand tests for comparative purposes on samples collected from the plant and the distribution system also assist in determining whether pollution is being drawn into the mains. Any sudden increase in chlorine demand or decrease in chlorine residual at a point in the distribution system calls for a field survey in the vicinity. Frequent routine samples should be collected from the distribution system for bacteriological analysis, with an immediate check made of any unusual results.

The reduction in carrying capacity in the mains often contributes to low pressures with their attendant hazards. Examination of the mains whenever they are opened may reveal corrosion or biological growths retarding the water flow. When this occurs corrective measures should be instituted at once. Chlorine is effective in controlling most biological growths; and various chemicals, particularly the glassy phosphates, have proved their value in inhibiting corrosion or deposition.

Offensive tastes and colors which are occasionally reported from distribution systems should be investigated. Often the elimination of dead ends removes the cause for complaint. At other times this requires specialized chemical treatment of the entire supply.

Waterworks personnel will function more effectively and with less effort if adequate records and plans of the waterworks system are maintained. The records should include a comprehensive map showing the entire system; sectional maps which show the details of the system; and valve records for the use of field crews. Drawings of the water purification plant will be most helpful if they include a general plan of the plant; location of meters; points at which chemicals are added; details of mixing and coagulation basins; filters and clear wells; and the raw, filtered and washwater lines, appropriately identified. All valves within the plant should be shown along with the direction and the number of turns required to open them. When training new personnel, or when meeting an emergency, such records are invaluable.



● **CHART from Public Health Service shows population/number of samples ratio.**

All state health departments have engineering personnel who are trained to give technical assistance during an emergency. Many have laboratory facilities to help diagnose the cause of difficulties, should it be chemical pollution, tastes and odors, color removal or other operational difficulty. Emergency purification equipment, pumps, pipelines and similar facilities have been obtained by state health departments in the past to meet disasters.

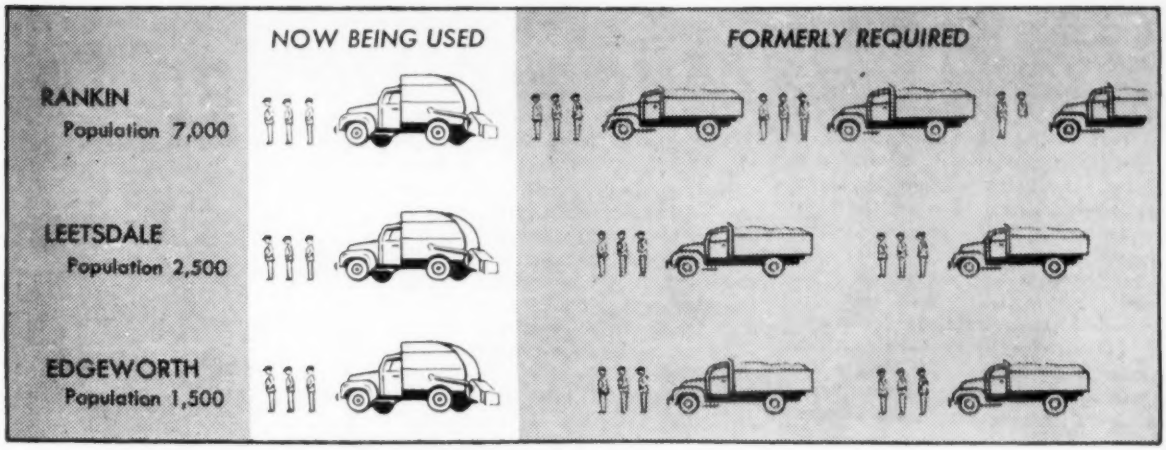
Consulting engineers, waterworks personnel from other cities, chemical supply representatives and sales engineers for equipment companies have a vast store of resources which can benefit a community during a disaster. Kansans living in the Kaw and Neosho river valleys owe much to this group for its assistance during the 1951 flood.

Designing, building and operating a waterworks system is a team job which requires the best efforts of the consulting engineer, the contractor, the equipment supplier and the waterworks operator. Protection of the public health is of prime importance.

The writer's colleagues, waterworks operators throughout Kansas and numerous consulting engineers are to be thanked for many of the suggestions in this article.

Bibliography

1. Public Health Reports, Vol. 58, No. 51, Dec. 17, 1943.
2. Culp, R. L. and Stoltenberg, H. A., Synthetic Detergent Pollution in Kansas. JAWWA, 45, 1187-1195. (Nov. 1953).
3. Thomas, Harold A., and Dallas, J. L., An Improved Settling Tank Design. Jnl., BSCE, 39, 354-372, Oct., 1952.
4. Eliassen, Rolf and Cummings, R. H., Analysis of Water-Borne Outbreaks, 1938-1945. JAWWA, 40, 509-528 (May, 1948).



MODERN Refuse Collection Equipment PAYS OFF *for the Small Community*

R. J. SNELBAUGH

Sales Representative

The Schnabel Company, Pittsburgh, Pa.

AS a sales representative for a company which distributes truck equipment I've had an opportunity to observe, first-hand, how several small suburban communities around Pittsburgh have achieved dollar savings and other advantages with modern refuse collection equipment, such as the compaction-type St. Paul Pax-all body we distribute. Perhaps my observations will help other small communities achieve similar savings and benefits by illustrating how modern and sanitary refuse collection actually costs less than outmoded methods.

The first big advantage any community gets from modern compaction-type refuse bodies is less equipment to operate and less personnel to carry on the payroll for strictly refuse collection purposes. As an example, I'll use three different size communities near Pittsburgh — the Boroughs of Rankin, Leetsdale and Edgeworth.

Rankin, which has about 7000 population, used to operate full-time the equivalent of 2½ open-type refuse trucks, with crews. (The borough owned two trucks and hired a third truck every other week.) Now one 9-yard St. Paul Pax-all Unit with a driver and two collectors handles the entire refuse collection in a 5-day, 40-hour week. Collections are made once per week.

The smaller Boroughs of Leetsdale (population 2500) and Edgeworth (population 1500) each operated two open-type refuse trucks. Each was able to eliminate one truck and driver by switching over to a 9-yard Pax-all, using one driver and two collectors. Neither borough operated its refuse collection full-time originally, but now operating time has been cut substantially. Edgeworth makes its refuse collections in two working days a week and Leetsdale in three working days a week. Each borough makes one residential pickup a week. Leetsdale, incidentally, was sold on the economies of modern refuse collection equipment by borrowing Edgeworth's Pax-all three days a week for a three week period.

These two boroughs use their collection crews for other work that has to be done in the community after the refuse collection has been taken care of. The economies of this labor versatility can't be overemphasized for the small community. The refuse collection isn't necessarily done in a full working day. Sometimes it's so scheduled that refuse collections are made mornings, the afternoons being devoted to other work for the crews.

Besides the economies of operation, and the greater use of collection crews on other jobs, these communities now have cleaner and more sanitary refuse collection. The enclosed bodies prevent paper and dust from blowing out and, especially during summer, flies are no longer a problem.

The community which believes that modern refuse collection equipment would cost too much is probably paying more than it realizes for its old system, just as were the communities I've cited. These boroughs, with modern, compaction-type refuse collection units, not only have proved to themselves that such good sanitation practices are within the means of any small community but actually get the job done at reduced cost.

Modern Design for

CATCH basins have been built in streets for the removal of storm water for upward of a century. During that time conditions have materially changed—dirt streets were graveled and then macadamized; now they are paved. Streets are usually kept fairly clean so there is practically no inert material to enter and clog the sewers. Consequently, there seems now to be small need, if any, for the old type catch basin with a trap and grit chamber. It is difficult to clean—and too frequently it is not cleaned. Accordingly PUBLIC WORKS conducted a limited survey to determine current practice in the design, location and construction of catch basins and inlets for handling storm water run-off. In the course of this, the editor found out what a catch basin "stone" is. It is a stone, usually granite, which is cut like a section of curb, but with an area hollowed out to permit inflow of the storm water into the inlet or catch basin.

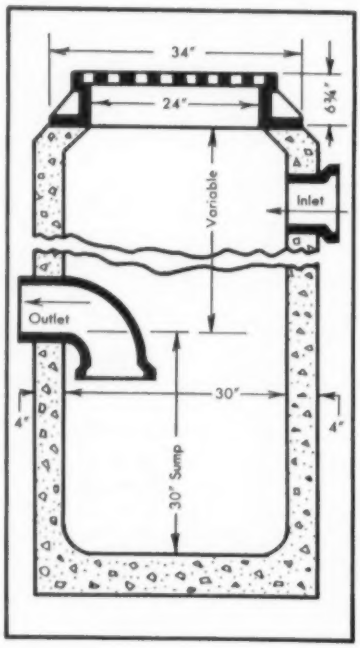
Portland, Maine, according to Byran O. Whitney, Commissioner of Public Works, uses catch basins, with such 4-foot or 6-foot granite stones, for inlets. These stones are set in the curb. The catch basins with the 6-foot stones (these have a longer opening) are usually built at the bottom of steep slopes. Barred metal covers or grates are set on top of catch basins. The catch basins themselves are of the type providing a silt or grit chamber which, of course, must (or should) be cleaned at intervals.

Hartford, Conn., practice as reported by Alden Wells, Chief Engineer, The Metropolitan District, uses a somewhat similar type of catch basin but with an inlet casting having longitudinal bars, which is in accordance with more recent research. Catch basins are cleaned about twice a year by Elgin eductors. Two eductors are usually in service and clean between 100 and 200 catch basins per five-day week.

Where sewer locations permit, catch basins are usually located at the upstream side of each street corner that is at the downhill end of a street grade; and also at intervals of about 300 feet in long blocks. Catch basins have been built, as occasion demanded over a period of nearly 100 years, and there is no accurate count of the exact number of catch basins in use in the Hartford sewer system. Catch basins now cost about $700 to construct, not including the casting which is furnished by the sewer district.

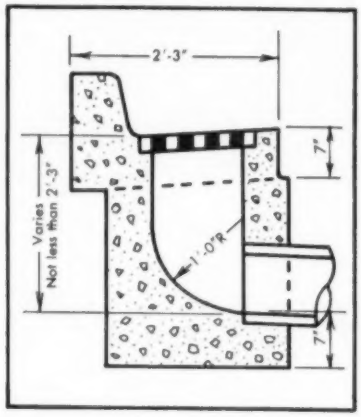
Miami, Florida, according to Arthur E. Darlow, Director, Department of Engineering, uses two standard catch basin types. One is for curb and gutter installation; the other is used for all other conditions. Both are of the silt retaining kind requiring frequent cleaning if they are to be effective.

Dayton, Ohio, Charles Abramovitz, Chief Engineer, Bureau of Sewers, adopted new designs for catch basins in 1953 as a result of studies and investigation by the



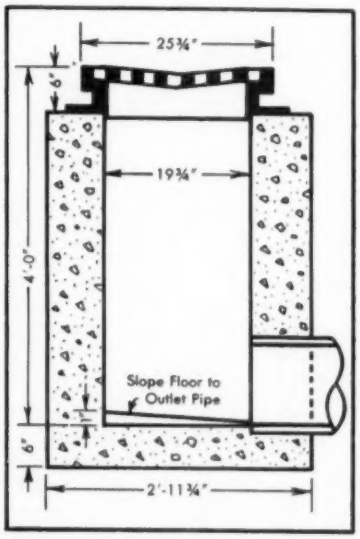
● **CATCH basin with silt chamber used in Sacramento, California.**

Bureau. Faced with the problem of utilizing the existing structures and of improving them so that their capacity would be increased, the new designs maintained the same top and normal size of the basin, but added a concrete apron in the street. The apron is shaped so that the smoothness of the street from a traffic viewpoint is not impaired, but the water in the gutter is turned toward and enters the catch basin. The normal catch basin is designed to admit 2 cfs to the storm sewer. The grade, crown and surface of the street determine the spacing of the catch basins, since all are intended to accept the same 2 cfs flow. If the flow is greater, spacing is closer. All of the new catch basins are of the self cleaning type, without a trap, as shown in the sketch on page 107.



● **SELF-cleaning type of storm water inlet as used in Phoenix, Arizona.**

New Orleans, La., uses a self-cleaning type of catch basin which is unique in that it is supported on subgrade mat of 2 x 12-inch timbering. This information was furnished by Albert G. Wyler, City Engineer. Omaha, Nebr., according to E. W. Woodbridge, City Engineer, uses a reinforced concrete catch basin of the self-cleaning type.



● **CONCRETE catch basin which cleans itself is the standard in Denver.**

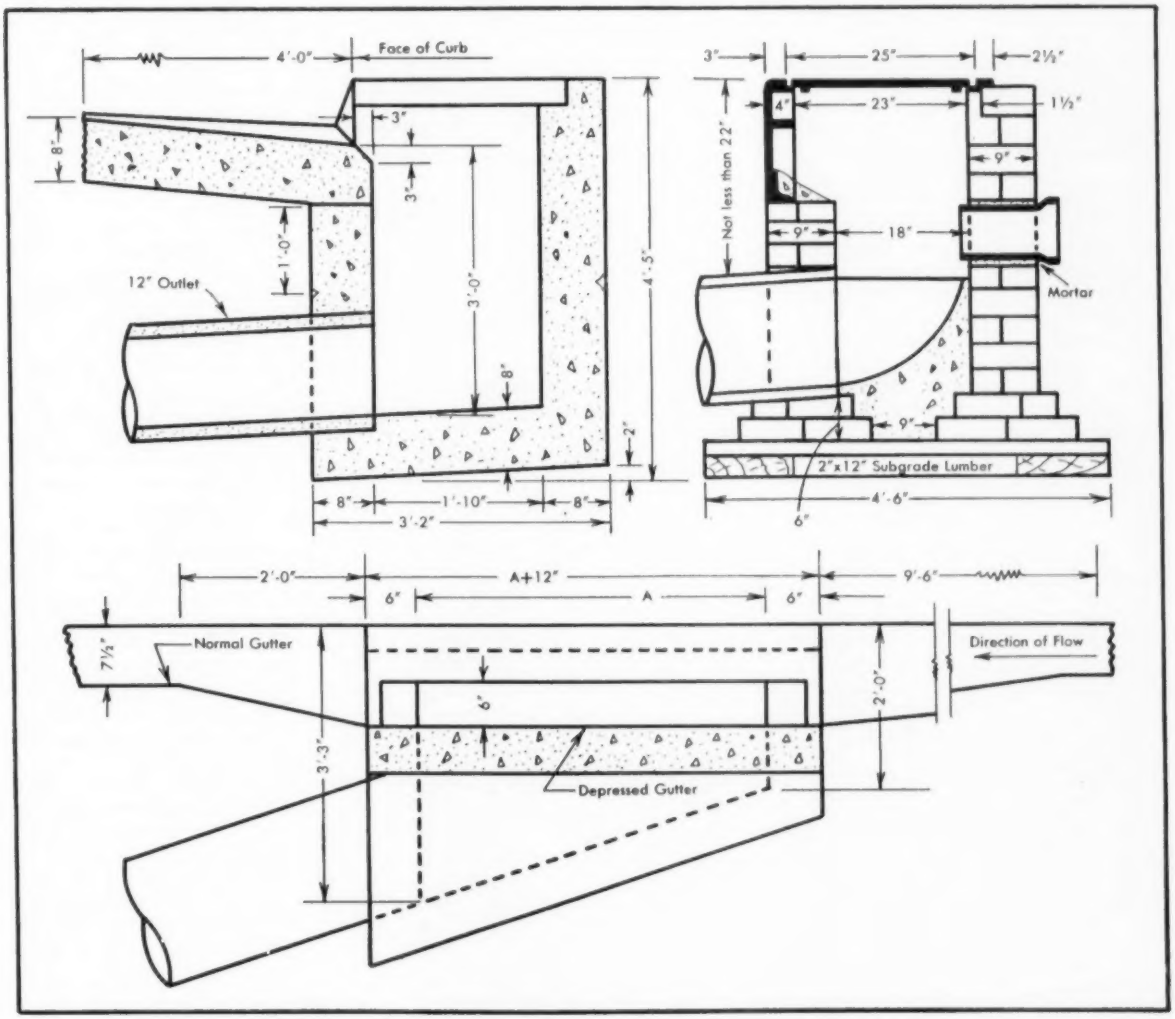
CATCH BASINS and INLETS for STORM SEWERS and DRAINS

Denver, Colorado, is using a concrete catch basin which cleans itself. D. S. Wright, City Engineer, states that the city is investigating the possibility of changing the design of the inlet grating to provide a greater percentage of openings. Also under way are studies involving redesign of the frame and grating of the curb type manholes in order to provide a larger throat opening in the curb head. Salt Lake City, Utah, builds a concrete inlet box of the self-cleaning type according to Roy W. McLeese, City Engineer.

Austin, Texas, as reported by C. G. Levander, Director of Public Works, uses a curb type inlet which is self-cleaning and does not retain or "catch" debris. The minimum size outlet pipe used is 15 inches. A study of inlet requirements for the collection of storm water on the city streets has been made using hydraulic theories and taking into account the longitudinal and transverse slopes on the street, height of curb, type of material, etc. While graphs have been made and are used in determining the size and spacing of inlets, the result is often modified by using judgment in the specific case. An inlet with more than a 10-foot opening is seldom used; if a larger opening is indicated more inlets are used to intercept the excessive flow.

Phoenix, Arizona, uses a simple inlet of the self-cleaning type. R. G. Baker is City Engineer.

Sacramento, California, has made no changes in the sump type of catch basin used in the past, says J. C. Jennings, Assistant City Engineer.



● **ALL self-cleaning types: Used by Dayton, Ohio, upper left, New Orleans, upper right and Austin, Texas, bottom.**

ECONOMICS in a HIGHWAY RELOCATION

GUY BROWNING ARTHUR

PROGRESSIVE improvement of the Oregon Trail, U. S. Highway #30, section after section, has brought the construction to Arlington, 145 miles east of Portland. The highway improvement is valuable beyond question, and the new road is expected to carry three times as much traffic as the old circuitous location. Little official attention has been given to the effect of the relocation on Arlington, but it is important in an over-all analysis. The economy of a highway cannot be separated from that of the towns along the way.

The last major improvement of this famous road was in the days when "scenic" was the byword, and that meant climbing all the inaccessible heights for views, getting up and down by traversing as much land as possible with serpentine curves, zig-zag wiggles, and hair-pin cut-backs. In most sections U. S. Highway 30 had to stay up, because the railroad got there first and took the narrow level bench between the straight-up bluffs and the Columbia River.

In this present program the driving motive is to lay down a wide, safe, fast road along the river, making the railroad move over in some places and filling land along the shore in others. Sheer determination shows in most of the relocation, and before long this stretch across Oregon will be one of the fine highways of the country.

Difficult solutions cannot be avoided in such a struggle for easy grades, long tangents and sweeping curves, and the one at Arlington is tough. The town began as Alkali, about 80 years ago. There was no flat ground for a settlement, so citizens built along the road which jockeys up the gulch beside China Creek. It became Main Street, and is a prolonged "S" curve through the town, with a sharp hair-pin turn at the upper end where it swings back to start the steeper climb around the bluffs to the top.

The highway has remained on this location all these years. It is a delight to devotees of the "scenic" in highway design. It makes a lovely setting for the town, now called Arlington, with a population of about 600. People come here for a vacation, and many more should come from now on. Normally the town should grow steadily, and become a more important stop along the highway.

But no engineer would accept this location for part of the improved Oregon Trail. The standards established for the improvement could not be met, and the necessary concession to the town would be too great. It would destroy the town to take the 100-ft. right-of-way, and even then the approach to the bluffs could not be graded at a reasonable cost.

The Arlington section is one where the road cannot stay down. There isn't room enough between

TABLE 1—ECONOMIC ANALYSIS OF ARLINGTON RELOCATON

Item	Unit	Present Highway	New Highway	Difference
Length	Miles	1.61	0.95	—0.66
Rise & Fall	Feet	232	130	—102
Central Angle	Degree	469	47	—422
Estimated Cost	Dollars	...	$280.765	.....
Annual Cost	"	...	13,663	.....
Annual Benefit	"	...	162,596	.....
Qb		...	11.90	.....

(The Benefit Quotient, Qb, is the annual benefit divided by the annual cost)

● NEW location near the junction with old road about half way up the bluff. Railroad below new location.

the foot of the bluffs and the river, with the railroad in place, and it has to go up on top. The improved road comes into town from the west on the old location, but there the divergence begins. Instead of turning up Main Street it cuts straight across, through a laundry and the distributing plant of an oil company, and heads for the bluffs on a long, easy grade. It cuts through the old route half a mile from town, a few feet below grade, and continues to the top of the bluff. The old road will be dropped into the new one for a back entrance from Arlington. The effect is to make Main Street a dead-end thoroughfare.

This is different from an ordinary by-pass, or a relocation which leaves the factors in somewhat the same relation to each other. This makes Main Street a kind of stem which serves only the town.

The Quotient Benefit

The State Highway Department made its economic analysis of the section as shown in Table 1. In this table, the Benefit Quotient, Qb, is obtained by dividing the annual benefit by the annual cost.

In a letter commenting on the economics of this section, H. G. Smith, Construction Engineer of the Highway Department in charge, states that these benefits are to the highway user only, and that they made no analysis of the effect on the business of the town. He calls attention to increasing traffic on a local road coming into town from the south. He thinks the hotel and restaurant business will not be changed. Also, he believes one or two of the service stations may have slightly less business but other stations will gain, leaving the net result about as at present.

He observes that whenever a highway is improved so that speed can be increased, there is some adjustment of overnight stopping places. Here the advantage may be against Arlington. During past years the speed on this highway section was slow. It was not safe to drive the serpentine curves and difficult ascents and descents at more than 40 mph, and speed was reduced to 25 or 30 mph in the winter and in fog. Pendleton, the next good stopping place to the east is 72 miles away; Pasco, Washington, is 80 miles to the northeast; and it is 54 miles to The Dalles on the west. Many a driver will remember Arlington as a good place to spend the night during foggy weather.

Both speed and volume will step up rapidly when the Arlington section, and also the Heppner-Junction section, are opened. Cars and trucks will be quick to change back to Highway 30 when the road is straight and safe, eliminating such curiosities as the "Rowena Wiggles" which wrap around one high bluff. But how much of this bigger, faster volume will stop in Arlington?

● **ONE of the three service stations located on the hair-pin curve. They have been good properties while on the old highway but will be isolated by the new location.**

In a complete consideration of the effect of this relocation, the analysis of the State Highway Department stands for the highway, and against the town.

One man said, sourly, "I've seen towns by-passed before." Many such comments were heard on the street. Years ago towns clamored to have the highway come right down the main street, but today they petition the engineers to keep it outside. Arlington citizens think cars and trucks bring 50 percent of their business, and that the loss of this traffic will be tragic.

For a town of 600 to have seven large filling stations is rare, and this supports the belief that many cars spend money here. Taking this part of the picture alone, the change threatens serious loss. Three of the stations are at the far end of Main Street, on the hair-pin turn at the bottom of the steep climb. All three lessees said they would vacate their leases when the new location is opened next summer. It is evident that not even one station can remain here. The three have been pumping 50,000 to 60,000 gallons of gasoline per month, total. The three station properties are worth possibly $80,000.

The motor court, located on the outside of the hair-pin turn, will stay in business. It is the only one in town, with 32 good looking units, and the owner thinks travelers will follow good signs to his court.

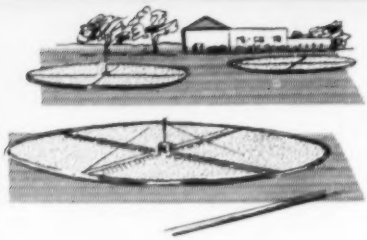
In the middle of town are three more service stations, one of which is a distributing plant for a major oil company. These three together pump about 45,000 gallons of gasoline per month, and the station properties are worth about $70,000. The lessees think they will lose 75% of their business.

One big station is located at the corner of Main Street and the new location, and will have an increase in business. The big garage across the way, in full view of traffic from the west, will also have an increase. The storage plant of another big oil company is being moved off the location, adding a super service station.

The feeling among merchants along Main Street is similar to that of the uptown service station operators. They think they will experience a severe loss.

Now for the optimists' side of the situation. In his letter, Mr. Smith mentions one of the most important gains from the relocation—elimination of the incessant noise of cars and trucks. The back-firing of vehicles hurtling down the steep grade behind the town is bad enough. But this is nothing compared with the noise of the up-hill pull. Every truck makes the turn into Main Street, struggles through jangling gears into second, puffs and snorts to gain a little headway before going into low, with still more racket, and finally gets set for the hard, clattering, rumbling pull up the long grade to the top. The noise is below, right in front, and above. No one who has ever stopped in Arlington overnight will forget it,

(*Continued on page* 116)



TREATMENT PLANT

C. W. KLASSEN,
Chief Sanitary Engineer,
Illinois Department of Public Health.

L. D. HUDSON,
Principal Sanitary Engineer,
State Properties Section,
Division of Sanitary Engineering,
Illinois Department of Public Health.

R. G. THOMAS,
Sanitary Engineer,
Lee County Health Department.

DURING the past few years increases in garbage grinding installations at many state institutions have made it necessary for us to anticipate the effects of such grinders on sewage treatment plant design and operation. The Dixon State School has a conventional sewage treatment plant of quite modern design which is now functioning under a heavy loading of ground garbage. The 29 grinders in operation last fall served about 4900 of the 5200 population, so that about 94 percent of the garbage produced in the school is being ground and discharged into the sewage. The program of grinder installation is being continued and will soon be completed.

The Dixon State School trains the mentally retarded. In addition to schooling, it provides housing, recreation, occupational development and medical care. There are about 70 buildings, with 39 kitchens producing garbage. The ward buildings, housing 50 to 100, have nominal facilities for food processing and serving, but do not have storage for left-over food. Garbage production per capita is consequently greater than in the average home.

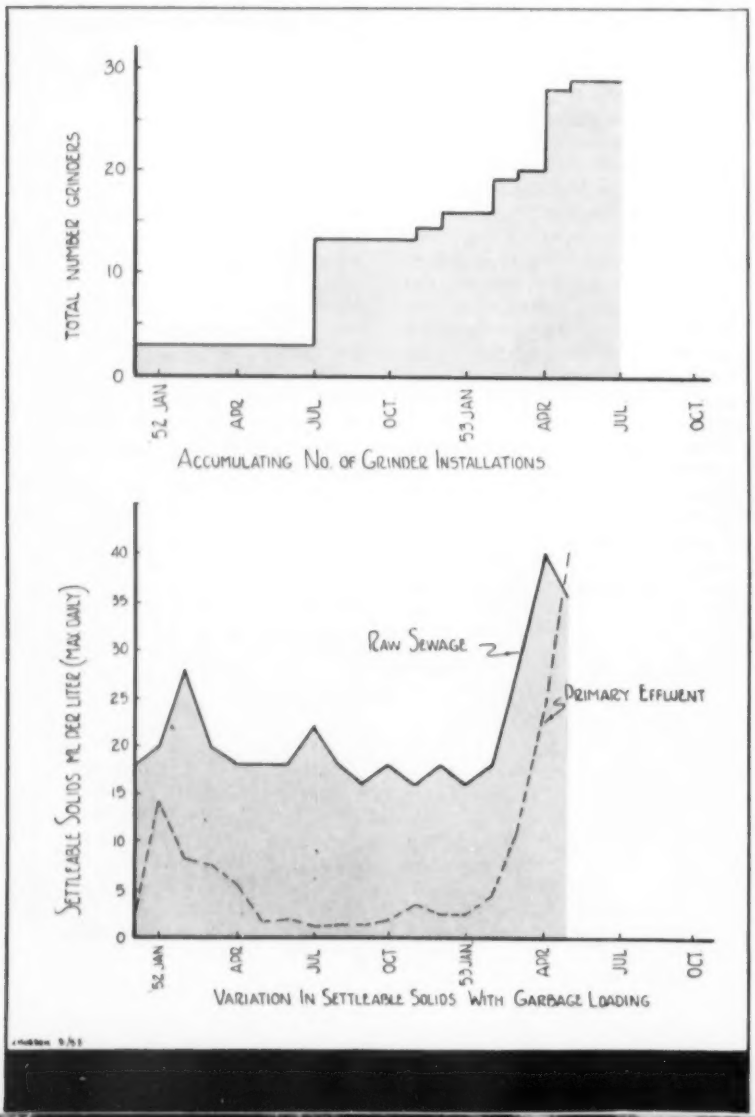
The 29 grinding units in service include six Waste King, five Salvajector and eighteen Disposall grinders. No serious maintenance difficulties have occurred as a result of patient use. Occasional breakdowns due to silverware damage have taken place, but probably no more than should be expected from normal household use. The use of grinders has eliminated many difficulties in the handling of garbage and has received the full support of the institution management.

Garbage Output—A careful check on garbage production for each building for the period October, 1948, through October, 1949, showed an average daily production of 4480 pounds of edible and 325 pounds of inedible garbage, a total of 4805 pounds. Based on a total population of 5287, garbage production was 0.91 pound per capita. A study at the Lincoln State School for the same period showed a production of 1.0 pound. In both schools the garbage was fluid in consistency.

The Sewage Treatment Plant

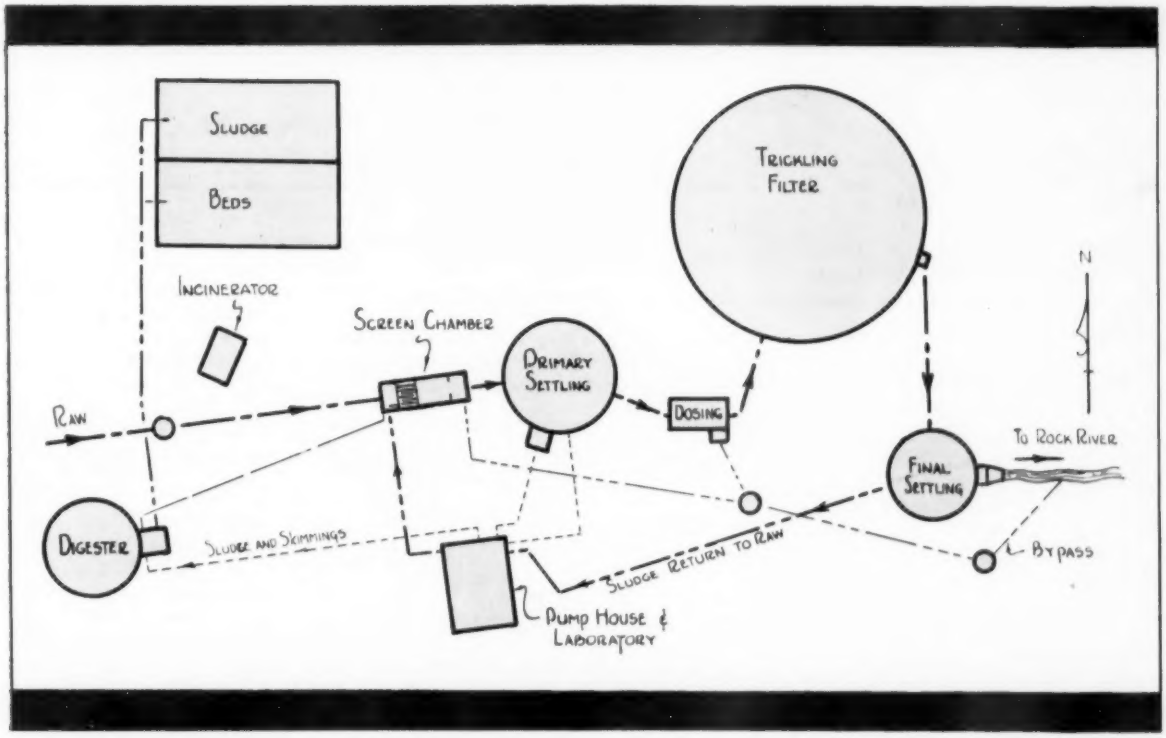
The sewage treatment plant for the Dixon State School was constructed in 1938. Design was based on a population of 5000 using 150 gpcd over an 18-hour day. The plant units are as follows:

A Chain Belt mechanically cleaned screen having 1-inch clear openings.



● **GRINDER installation and settleable solids relationship.**

takes Ground Garbage in its Stride



● **PLANT layout and plant units at Dixon State Hospital where ground garbage is treated with minimum of difficulty.**

A coke fired incinerator is provided for burning screenings and other wastes. Much grease and heavy rag loadings have occurred.

A 45-ft. diameter, 9-ft. deep, circular clarifier, Dorr equipped. A mechanical skimmer was added in 1948.

A trickling filter 108 ft. in diameter and 6 ft. deep, with a 4-arm rotary distributor. The filter media is 1½ to 2½-inch granite.

A secondary settling tank 34 ft. in diameter and 7 ft. deep, equipped with Dorr mechanism.

A single-stage digester, 37 ft. in diameter and 20.5 ft. deep, heated, and with a PFT floating cover, external heat exchanger and auxiliary oil firing.

Sludge drying beds, uncovered, with an area of 5050 sq. ft., divided into two compartments, and designed for a filling depth of 1.5 ft.

Following the installation of the grinders, a comprehensive study of the sewage treatment plant was made during the period Aug. 29 through Sept. 3, 1953. At this time, it was found that sludge removal from the primary and secondary settling tanks was inadequate due to the low efficiencies then being obtained from certain of the sludge handling pumps. Following correction of these conditions and measures for the utilization of certain excess sludge on farm lands, a recheck of plant performance was made Oct. 6 and 7, 1953.

This study was made jointly, through the cooperation of the Lee County Department of Health and the State Properties Section of the Illinois Division of Sanitary Engineering, for the Department of Public Welfare.

Results of the Study

Flow of Sewage—The average daily flow of sewage, Aug. 29 through Sept. 3, was 0.590 mgd, with a daily maximum (Thursday) of 0.628 mgd and a daily minimum (Sunday) of 0.483 mgd. On four occasions, momentary peaks of 1.6 mgd were recorded, and also one sustained 30-minute peak of 1.25

mgd. For the 6-day test period, an average of 9.3 percent of the flow reached the plant between midnight and 6 AM. Average daily water pumpage was 150 gallons per person. The actual sewage flow was 114 gpcd. A prolonged dry period preceded the test.

Sewage Strength—Both 24-hr. and 18-hr. composites were taken, the latter between 6 AM and midnight. Normal domestic sewage in Illinois has a BOD of 200 ppm; other studies have indicated that wastes from schools similar to Dixon not grinding garbage will average 300 ppm BOD. Results of this study showed that the Dixon State School sewage, including the ground garbage, ranged from 400 to 590 ppm BOD. The four 18-hr. composites average 512 ppm of 5-day BOD; the two 24-hour composites average 495 ppm. Temperatures were uniformly high, averaging about 83°F.

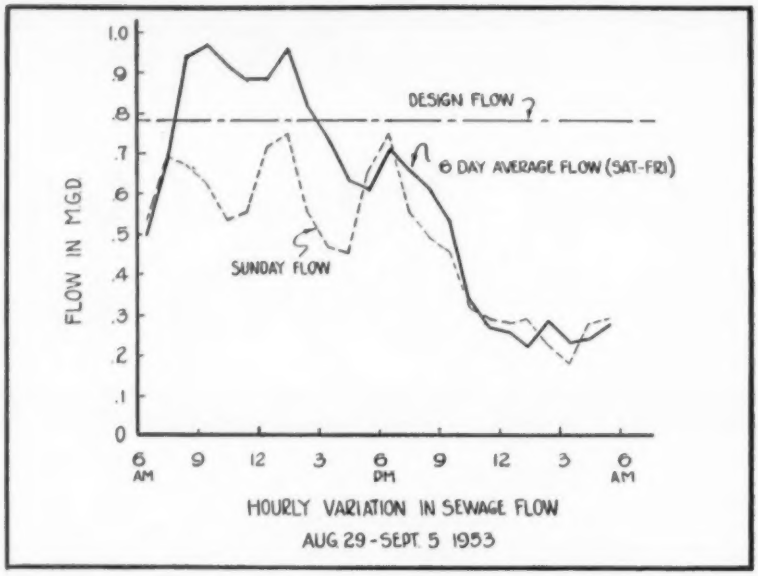
Primary Settling—Surface settling rates ranged from 375 to 411 gallons per sq. ft. per day and weir overflow rates from 4220 to 4620 gals. per ft. per day. As previously stated, sludge removal from the primary settling tank was inadequate at the time of the Aug.-Sept. study. Sludge volumes were consequently determined from raw settleable solids. Sludge volumes, as corrected for the 24-hour period, were as shown in Table 2.

Table 2—Primary Sludge Volumes

Date, 1953	*Gallons*	*Day*
8/31- 9/1	8,042	Monday
9/1 - 9/2	8,176	Tuesday
9/2 - 9/3	7,003	Wednesday
9/3 - 9/4	5,675	Thursday
10/6 -10/7	7,399	Tuesday
10/7 -10/8	5,062	Wednesday

The efficiency of primary settling is shown in Table 3.

Trickling Filter—Based on a 5-day BOD of 325 ppm from the primary settling tank and an average flow of 0.573 mgd for the first 4-day run, the loading on the filter was 28.1 pounds of BOD per 1000 cu. ft. (1124 lbs per acre-foot or 0.75 lb. per cu. yd.) The hydraulic loading for the 4 days was 2.82 mgd per acre per day. Under this very heavy organic loading, removal of both BOD and SS by the filter and the secondary clarifier was excellent, approaching 90 percent after the sludge removal inadequacies were corrected. These efficiencies are shown in Table 3.



● **TYPICAL 24-hour flow curve for an institution. This is a composite of flow for the 6-day period, with the flow for Sunday shown separately.**

Special attention to the cleaning of the orifices in the distributor arms is required every 2 to 4 hours from 8 AM to 5 PM. Orange peels, tongue depressors and similar objects must be removed. Ponding of the filter has not been a problem because careful daily attention is given to the filter surface. The small

(*Continued on page 156*)

TABLE NO. I—RAW SEWAGE CHARACTERISTICS

Date	*8/31-9/1*	*9/1-2*	*9/2-3*	*9/3-4*	*10/6-7*	*10/7-8*
Hours Composite	24	24	18	18	18	18
Flow During Period (MGD)	.596	.620	.526	.550	.591	.542
pH	6.7	6.8	6.9	7.0	7.5	7.6
Total Suspended Solids (ppm)	320	370	280	250	210	260
Volatile Suspended Solids (ppm)	270	320	240	230	190	230
Total Solids (ppm)	1250	1140	1130	1380	980	1310
Total Volatile Solids (ppm)	560	620	660	640	550	700
B.O.D. (5-day) (ppm)	590	400	460	530	500	560
Anthrone—Carbohydrate (ppm)	170	110	80	72	260	110
Temperature Range, Degree F.	80-88	78-90	80-92	78-92	74-95	76-88

TABLE 3—SEWAGE TREATMENT PLANT EFFICIENCIES

	Percent Removals					
Test Dates, 1953	*8/31*	*9/1*	*9/2*	*9/3*	*10/6*	*10/7*
Primary Settling						
Suspended Solids	15.6	—1.6	35.7	1.2	28.3	42.2
B. O. D.	25.5	25.0	47.8	39.6	...	39.6
Carbohydrates	81.0	45.3	59.8	15.2	87.3	90.0
Secondary Treatment						
Suspended Solids	83.0	65.8	56.7	78.6	90.0	86.6
B. O. D.	70.5	72.7	77.8	76.8	...	89.5
Carbohydrates	71.6	50.0	87.3	83.3	76.0	85.8
Total Plant Efficiency						
Suspended Solids	85.6	64.8	72.2	81.3	92.8	90.5
B. O. D.	78.0	79.5	88.4	86.0	93.0	93.5
Carbohydrates	94.8	72.7	95.0	88.5	96.8	98.5
Total Solids	27.9	28.0	26.5	41.2	...	45.0
Total volatile solids	...	...	...	...	56.2	71.2

STANDBY POWER FOR OPERATION OF AUXILIARY WATER WORKS EQUIPMENT

MELVIN WILLIAMS,
Chief Engineer, Water Dept.,
City of Dubuque, Iowa

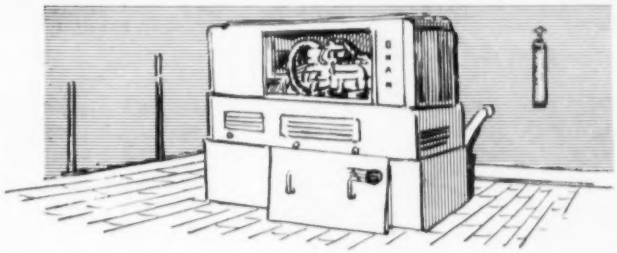
AFTER spring floods in 1951 and again in 1952, we realized what could happen if commercial power was interrupted. Therefore, a decision was made to install an automatic emergency electric generating plant capable of supplying power for all essential auxiliary pumping station equipment. Consequently, in April, 1952, the Dubuque Water Department purchased an Onan Model 25HN standby plant and the unit was installed in our Eagle Point Pumping Station.

This unit delivers 25,000 watts of 120/208-volt, 3-phase, 4-wire, 60-cycle electric current. An automatic line transfer control starts the Onan plant within seconds after the commercial power source is cut off and switches the load from the highline to the plant. When normal power is restored, the plant stops and the automatic control switches the load back to the highline. Five times, since the emergency plant was installed in 1952, the unit has automatically cut in and furnished all the electric power for this essential equipment: two ¼-hp electric motors for the station's oil burner; one ¼-hp electric motor for the condensate pump; four ⅝-hp and two ¼-hp motors for heating unit blowers; thirty 200-watt bulbs for lighting the building; and power for all the reservoir and tank gauges as well as for our shortwave transmitter and receiver.

The Onan gasoline-engine-driven emergency plant can also, during extreme emergencies such as floods, provide dependable electric power for running this additional equipment: two 5-hp, three 1-hp and six 1/3-hp electric motors for sump pumps and one 5-hp motor for priming the main pumping units. This unit has performed so well, that we have discontinued an auxiliary light line to the station, and use the unit for lighting and similar purposes when we have our main boards out of service for maintenance.

Our experiences have proven the value of emergency generating equipment in our Pumping Stations. Come flood or high water, snow or sleet, we know our equipment will remain in continuous operation.

● **WHAT** can happen to water works when a river goes on a real rampage.



● **PUMP** room at Dubuque's Eagle Point water works pumping station. The standby unit described in the article is at the left center near the window.

Building

A COMBINED CONCRETE CURB AND GUTTER

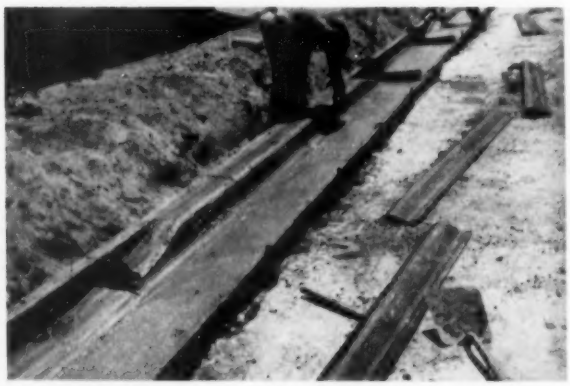
Concrete pavement was placed recently on Hillsborough Ave., Tampa, Fla. This street carries very heavy traffic including that of U. S. 41 and 92. Excellent workmanship prevailed throughout, particularly in building the concrete curb and gutter. Illustrations on this page show the steps in this construction.

The contract for the street paving and incidental work was awarded by the state road department, of which Sam P. Turnbull is state highway engineer, to the Brinson Construction Co. of Tampa. Construction was under the direction of Richard Green, with M. R. Carn, superintendent for the contractor.

● **STEEL** forms being set for combined curb and gutter

● **FORMS** and spacer plates in place on the street.

● **READY-MIXED** concrete being placed in the forms.



● **FINISHING** surface with wooden float after removing forms.

● **USING** edging tool to round corners of curb and gutter.

● **FINAL** finishing operation with use of steel trowel.

● **WORKING the oil into the street surface by use of a motor grader. Oil was mixed to a depth of about four inches.**

● **SPRAYING the oil with a city motor distributor on the exposed surface beside the windrow of oil-treated earth.**

OIL STABILIZATION for STREET MAINTENANCE

B. H. CRUCE, City Manager, Pampa, Texas

"CAN'T you do something about our street?" is a familiar question around any city engineer's or city manager's office. When it is dry, housewives complain about the dust, and when it is wet the man of the house complains about the mud.

Pampa, a city of 20,000 in the Texas Panhandle, is plagued with those same complaints. It has a very successful voluntary paving program, but many people cannot afford paving. Yet, they want something done about their streets in order to get to work in bad weather and lessen the housekeeping during dry weather.

Being on the edge of the Panhandle oil field, Pampa is fortunate in having crude oil available nearby for street maintenance. Crude oil does a good job of stabilizing if its mixture with dirt is not too rich.

Oil furnished by property owners is hauled and put on any residential street requested without further charge. Property owners who cannot afford to pay out extra money for oil keep an alert eye open for all waste oil. Sometimes they find it free and sometimes they must pay a nominal sum for it. Commercial grades of oil are always available.

For a block that has never been oiled, it takes about two hundred 42-gallon barrels of oil. A block that has previously been oiled, requires anywhere from seventy-five to two hundred barrels. When the oil has to be purchased, the property owners contribute toward its purchase on a voluntary basis. In most cases, enough oil is secured at one time to stabilize several blocks. One person canvasses the street to be oiled making the collections which run from one dollar up.

A City 1½ ton truck is especially equipped for handling oil. It has a high pressure pump and a 25-barrel tank. The oil is distributed onto the street through a spray bar at the back of the truck. The only other piece of equipment used is a Caterpillar maintainer, size 112, for working oil into the street surface.

Here is a good example of excellent cooperation between officials and citizens to do the best possible job with the materials available. Not all of us can have an oil well in our back yard, but the job, as described, can be done with commercially available SC-2 asphalt.

Streets stabilized with oil are streets with original soil, which is a black loam in Pampa. Oil is sprayed liberally on the street and the maintainer then cuts just below the oil to mix it with the dirt. The dirt is usually windrowed to the center of the street and oil is sprayed again liberally on each side. Each time this is done, the maintainer cuts below the oil, mixing it with more dirt. The maintainer works this dirt back and forth until it is well saturated. The surface is cut to a depth of two to six inches, depending upon the amount of oil available.

After the dirt is well oiled, it is spread over the roadway and left for the traffic to pack. A few days of traffic on the average street gives the roadway a hard, smooth surface. However, if the mixture has been too rich, the roadway becomes too soft and forms a corduroy appearance. If such spots are large, they are re-worked; however, in most cases such spots are small and are left alone to cure themselves.

Once a block is well stabilized, the street department does not tear up and rework it until it is positively necessary even though holes appear in the roadway. People prefer holes to a street that is muddy or dusty. A well stabilized street will remain in fair condition for several years, depending, of course, upon the amount of heavy traffic it is required to carry.

Gray County, as well as several of the other counties in the Texas Panhandle, has several hundred miles of oil stabilized rural roads. These roads are superior to roads hard surfaced with gravel or caliche because oil stabilized roads are never dusty and do not require dragging after each rain.

● **Pumping waste oil from a pit in the Panhandle. Usually the oil costs nothing but sometimes a nominal charge is made to the property owners.**

Russell Cartwright, our street superintendent, has had several years experience in oil stabilizing both city streets and county roads. Lately, he has experimented in oil stabilizing not only the street roadway but also the drainage ditches. In these cases, he used a roller to pack the ditches. Where the drainage ditches are not too deep, this method is very satisfactory. Driveway culverts are eliminated and the street's appearance as well as the drainage is greatly improved as a result of our work.

Oil stabilization does not necessarily mean a saving in dollars and cents to the taxpayers on street maintenance, but it builds mountains of goodwill among citizens and city administrators. And, in the long run, it causes people to strive harder to get permanent paving on their block. The people get used to an all-weather street and want to make it permanent.

It takes a half day with a three-man crew, two men working on the oil truck and one man on the maintainer, to oil stabilize a 300-foot block. But goodwill alone would make oil stabilization worthwhile even if it cost more than regular street maintenance.

Since writing this, Mr. Cruce has become City Manager of Greeley, Colo.

Highway Location

(*Continued from page* 109)

even if he slept. Stoppage of this noise will make Arlington a different place. This noise factor may be psychological, intangible, or something else not commonly thought of as belonging in an engineering survey, but there is no doubt about its great importance in this situation.

Jack Harford is mayor of Arlington; a good plain citizen making money in his business. He smiles wryly at the fears of others. To him Arlington is on the up-and-up. Traffic will grow, and bring more trade. With the noise stopped, the town will be a quiet place for overnight and summer guests.

He says the Chamber of Commerce is being revived with artificial respiration to start a vigorous program for the town. Big signs are to be erected along the highway, advertising the town rather than the merchants. The streets are to be cleaned up, with new walks and paving. Paint-up and clean-up campaigns are to be started. Community beautification plans are being thought out. To him Arlington is to live more abundantly than ever before, with plenty of community oomph.

L. C. Buchner, cashier of the Gilliam County Bank, isn't worried, and he should be if there is any cause for it. He organized this bank some years back, and has had to believe in Arlington. He is pushing the booster program. On his desk was a pile of plans for completely rebuilding the interior of the bank. He is trying to get it started very soon.

At the Welcome Hotel there is a new bar costing at least $15,000, and much more than this has been spent on other improvements. Down at the Vendome Hotel there is a swank new bar done in the spirit of the cow-punching West, and costing more than can easily be guessed. This hotel has been done over inside and re-furnished since construction began on the relocation.

"Ham" Hamaman, owner of the Vendome, will listen to only the brightest blue-sky expectations. He is back of the booster program, and is making an inventory of the attractions to be claimed for Arlington.

Summing it up, this doesn't look like the demise of Arlington. It isn't likely that the place will be added to the list of ghost towns. The first shock has been absorbed, and the bounce is just beginning. It appears, rather, that the relocation will force Arlington to become a better place to live in and to visit, with more substantial prosperity. And this turns out to be true of most such construction for the benefit of the larger body of the public.

A state highway department can turn such a situation to good account in its relations with the public. A construction right-of-way 100 ft. wide is a pretty thin line through the community we are trying to serve. It wouldn't cost much more to establish an economic belt twenty miles wide along the highway, and study it as intensively. That would take towns like Arlington into an economic analysis. It would bring credit to the highway department to forestall the depression, and to spark-plug the bounce.

• • •

City Controls Trees on Public Property

Though the city owns, tends and can remove trees on public lands along streets, owners of property fronting on such streets are responsible for watering these city-owned trees, and also shrubs and plants, in Monrovia, Calif. Each year, at the end of the summer, the city prepares a list of trees that are to be removed during the coming year. A notice to this effect is put on every tree and a copy sent to abutting property owners so that they may register objections if they wish. Such objections are later considered by the recreation board and final action is taken by the council.

LAND TRADE
gave us a
NEW PUBLIC WORKS GARAGE

HERMAN G. KUHN,
City Engineer
Tiffin, Ohio

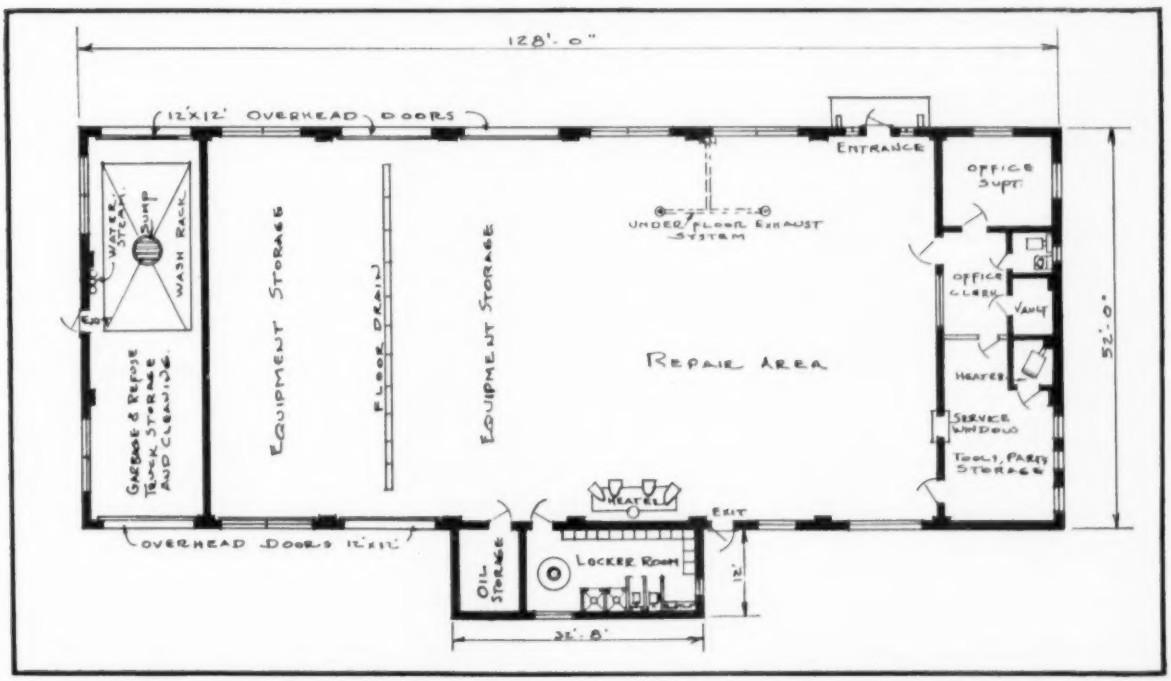
A WINDFALL, unsolicited and unexpected, came to the City of Tiffin recently; and it was a mutual benefit, both to the City and to a local automobile sales agency. Here is what happened to our city of some twenty thousand population. The automobile sales agency needed to expand its operations, and the only direction available was on property owned by the City and being used for a garage and storage yard for the Department of Public Service. However, it also happened that the storage yard and buildings were becoming more and more inadequate for the needs of the Department if it was to operate efficiently and render good service to the public.

The sales agency desired to purchase the property of the City, and entered into negotiations with the city officials for that purpose. It was decided by the officials that the selling price of the property would have to be sufficiently large to cover the cost of replacing the present land and buildings; otherwise the public would be critical of the exchange. The City Engineer was called upon to make an estimate of the probable cost of a new site, a new building and sewer, gas and water main extensions. This estimate showed a probable cost around $55,000.

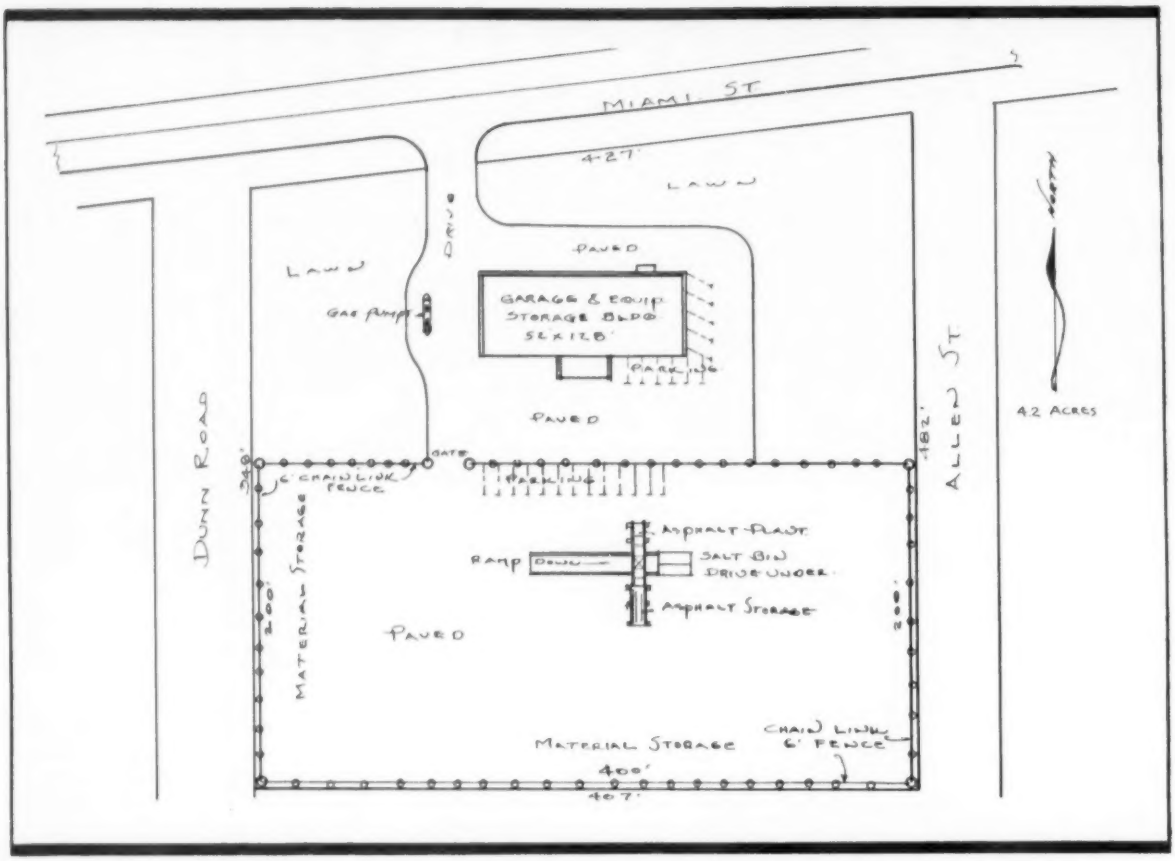
After the estimate was made, the City Council enacted the necessary legislation directing the Board of Control to receive sealed bids for the purchase of the city property. This was done in accordance with the laws of Ohio governing the sale of city-owned real estate and a bid was received from the sales agency in the amount of $55,000. This was decided to be sufficiently within the range of the estimate and the bid was accepted.

For the new building, a site containing 4.2 acres—ample for our needs—was located near the edge of the city. An especially desirable feature was its accessibility on three sides—a change much for the better since the old site had but one entrance and that a narrow and often congested one.

A general layout plan was made after discussion and study with the Street Superintendent and the Service Director. It was decided to place the main building in the north middle part of the plot, facing north, with the main entrance from Miami



● **FLOOR plan of Tiffin's new public works garage, showing the facilities and conveniences that were provided.**



● **LAYOUT of the lot on which the new garage is located. Fence 6 ft. high protects material storage area.**

Street. If needed later, drives could be built to two other streets. The entire area around the main building was paved, and can be used for ingress, egress and parking. Two gasoline service pumps were located just west of the building, one of which supplies regular and the other high octane gasoline. Each pump is connected to a 1000-gal. underground tank.

It was also decided to fence in an area, 200 by 400 feet at the south side of the plot for the storage of materials used by the Department. This fence is six feet high, chain-link, with extended arms having three strands of barbed wire. There is one 20-ft. gate, which can be locked. Also in this fenced-in area we placed our asphalt mixing plant, which can produce either hot or cold mix. In connection with the asphalt plant, we built an overhead 50-ton capacity salt bin for winter ice control use. By connecting the plant and the bin, the same ramp can be used for gravity loading of either asphalt mix or salt.

The main building is 52 feet wide by 128 feet long. It is of brick, concrete block and steel, with walls 12 inches thick. The front is brick and the other three sides are concrete block, waterproofed with colored Bondex to match the brick. The roof is of steel deck construction covered with one-inch insulation board and a four-ply built-up roof.

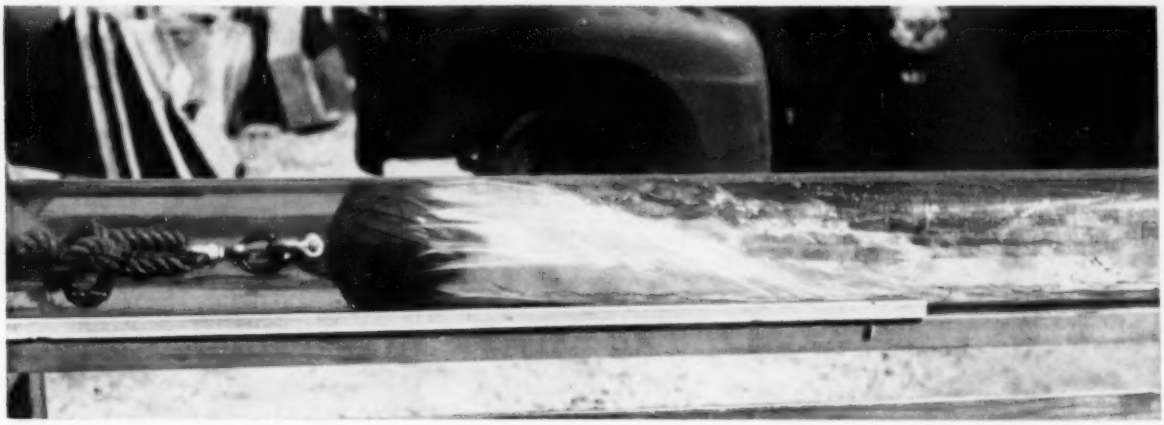
The floor plan is shown on the accompanying sketch. The last bay in the west end of the building is being used solely for the storage, cleaning and repair of two late model garbage and refuse trucks. These are thoroughly cleaned daily with detergent and hot water, and further steam cleaned as needed.

The offices for the Superintendent and Clerk are in the northeast corner of the building. The Tool and Parts storage room is located in the southeast corner. In this room are kept all small tools, neatly stowed away on racks. Steel filing bins are placed in a convenient manner so as to expedite the distribution of parts and mechanical supplies. A general repair area is located adjacent to the parts room. An underfloor exhaust system has been installed which carries off all exhaust fumes from motors or from repair operations.

The men's locker and wash room is separate from the main building and is located in the center of the south side of the main building. This room is equipped with a group washing fixture, shower facilities and locker storage. In the west end of this addition is located a fireproof oil and grease storage room, as shown on page 117.

The main building is equipped with five overhead doors, 12 ft. wide by 12 ft. high. Two doors directly opposite each other are operated electrically, and the other three doors are manually operated. The building is designed to store all the equipment owned and operated by the city and the equipment used daily is stored in areas most accessible.

The building was designed by the City Engineer with a view that, when and if additional space is needed for expansion, more bays can be added to satisfy future requirements. The total cost of the building, land, sewer, water and gas extensions complete was $55,000.



● **USING transparent plastic pipe, demonstration shows how sewer ball operates to flush deposits from the sewer line.**

How Los Angeles Handles Sewer Maintenance

SEWER maintenance operation in Los Angeles is an engineer's dream. The city is a metropolitan composite of a score of cities and towns on hills and in valleys, covering 450 square miles, and some of it is so hilly that it can never be used for dwellings. The terrain varies from these rough areas to the harbor section and the sea level canals in Venice.

One outfall sewer is 55 miles long. Other figures indicative of the scope of sewer maintenance are 4000 miles of main line sewers, 800 miles of storm drains, 35,000 catch basins, 120,000 cesspools and septic tanks, 96,000 manholes and 300 miles of open channels.

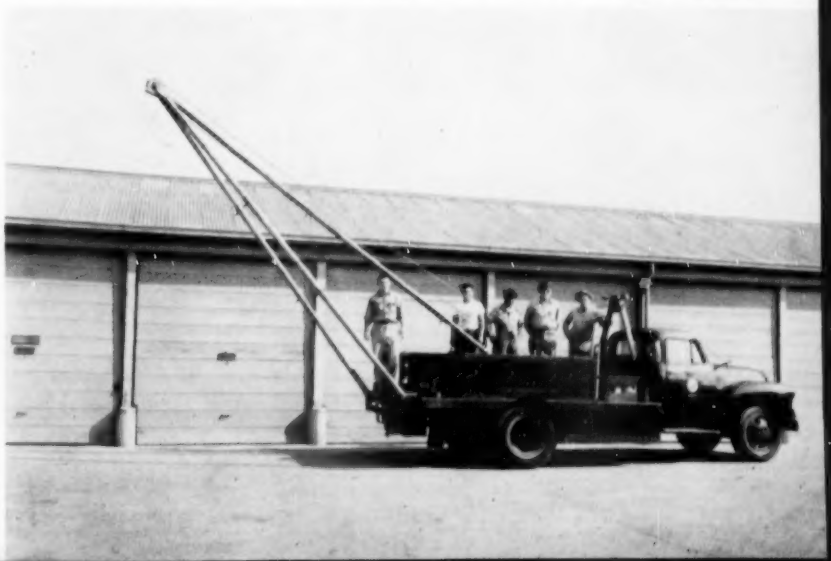
The long outfall sewer begins with 15-in. pipe, and ends with a semi-elliptical section 10 x 12 ft. It siphons under the Los Angeles River seven times, and these siphons concentrate gas which is drawn off by four ventilating plants with high stacks, located in the most effective spots.

Yet the operation goes along so smoothly as to belie its magnitude. Under Alvin A. Appel, Sewer Maintenance Superintendent, and James L. Carey, Assistant, there are five sections labeled General Administration, Pipeline Maintenance, Operation & Repair, Industrial Waste Control, and Channel Maintenance.

Fifty-six work crews are based in 5 yards. These are now being split up to make 10, for more effective covering of the city with less loss of time in travel and transportation. Two of these new yards are being built this year, one costing $75,000 and the other $95,000. This wider dispersion of bases is fully justified by the areas and population served, shown herewith:

The North District yard serves an area of 75 sq. miles and a population of 629,000; the South District, 61 sq. miles and 750,700 people; the West district 85 sq. miles and 249,000; the Valley District 212 sq. miles and 350,500; and the Harbor District 24 sq. miles and 91,000 population.

Crew operations at the North District Yard are typical of those at all the others. This used to be the main yard, and everything has grown up from here. The expanse of this yard, the many spacious and substantial buildings, the wide diversity of shop facilities, and the settled methodical routine show how a city keeps adding to existing facilities until a yard bursts out at the seams, and bases have to be moved nearer to work areas. This yard, as shown by the table, is large



● **HEAVY-duty construction truck used by Operation & Repair Division.**

● **MANY tools are used for cleaning sewers. Here is shown a winch and motor for use with the sewer balls and cones. Motor is used to rewind steel cable.**

enough for a city like New Orleans. Shops of all kinds operate steadily, and work which cannot be done in the other yards is brought in here. A $25,000 inventory is maintained in the stock room.

On an average morning, last December, 20 crews prepared to leave North Yard. The typewritten work schedule for the day details their designations, the number of men in each crew, their equipment, the location of their work, and the work to be done. Lumping these we have the following line-up of work that was to be done that day:

One crew cleaning channels; one constructing manholes; two cleaning catch basins; two constructing sewers; six cleaning and inspecting sewers; two picking up catch basin cleanings; one miscellaneous yard work; one night emergency; one detailed to help another crew; two loaned to other Public Works divisions and one given the day off.

There is spirit in this organization. The crew on the root-cutting truck boasted quietly that there were only 150 stoppages by roots last year, and kept right on putting the truck in order for the day's work. Probing was a bit out of order. All the crews know they are doing the job, and that's that. Their ideal is to be on the job ahead of trouble.

Equipment and Procedure

Sewer maintenance operates 63 trucks of all kinds, 4 sewer cleaning machines, 9 portable compressors, 9 portable generator units for supplying light, 25 blowers for drawing off dangerous gas ahead of work in sewers or manholes, and 30 pumps of various sizes for de-watering ditches. A tractor, a bulldozer and a skip loader are used for excavating, backfilling and repair work. Heavy equipment is rented as required.

All prime construction work is let out to private contractors, so the Division owns only the equipment required for maintenance.

One of the interesting features in procedure is that the work schedules are made up by the crews. A broad understanding of what must be done is developed in frequent meetings for all personnel based at each yard, and other meetings in the office for supervisors. There is an over-all program for routine work to cover the entire city twice a year. Within these limits each crew knows what is ahead of it, and moves from section to section without more direction. Each afternoon the foreman turns in his schedule for the next day, and by 9:00 am copies of the composite work schedule for all crews have been delivered to Alvin Appel and James Carey.

There is no guess work about the location of a crew, what equipment it has out, how many men it includes, or what it is doing. Anyone can look over the schedule and be sure of finding a crew within a few blocks of its reported location. This must be called "control" in administrative language, but it is superior in quality. It makes the most of the management philosophy that the more a man can be led to "work for himself" the less supervision is required. The work gets done in Los Angeles, with a degree of facility and dispatch that is attained in a city with only one or two crews.

This stems from the top, beginning with Milton Offner, Secretary of the Board of Public Works, and motivates every operation. Trying to pin credit on any one person meets with a sharp rebuff. Alvin Appel contends at every point that this is not a one-man operation. Out on the various jobs he meets the men in the crews like a buck private doing his own job well, and knowing that they are all doing theirs.

Nevertheless there is always the solid backing of good procedure to hold every man in line. A few minutes on the system of reporting work is enough to prove this. Each day a "Time and Work Report" is made up showing all the details of the day before: hours worked, truck mileage, class of work, units accomplished, men employed, equipment used, and a short narrative description. These daily reports go to the IBM machine, and the informa-

(*Continued on page* 188)

● **MORE equipment for sewer maintenance and repair work. Here are bucket machines, buckets, cones, etc.**

HERBERT R. PERKINSON, JR.,

Associate Traffic & Planning Engineer

Virginia Department of Highways

JUST as highway construction engineers observe the cardinal rule of good drainage—keeping the water off and from under the roadbed—traffic engineers have heard again and again the importance of uniformity in signing, marking and signalization work. Uniformity means that all similar conditions should be treated in an identical manner: every unusually sharp horizontal curve should be signed with reflectorized turn symbols; all grade crossings with advance warning discs and cross-bucks; points of restricted sight-distances with barrier pavement lines; and so on.

● **OVERHEAD truss carrying large directional signs on U. S. Route 1 at the south end of Shirley Freeway clearly points out choice of routing to motorists.**

SPECIAL SIGN TREATMENTS
for Problem Locations

The basic principle of uniformity is, of course, sound and in the vast majority of cases contributes immeasurably to guiding the non-local motorist to his destination with safety and ease. However, all traffic engineers have encountered isolated cases where, for some reason, despite all normal precautions, accident rates soar or the motorist is abnormally confused. The locations vary from relatively lightly traveled rural cross-road junctions to channelized intersections in densely populated areas, or from a fairly slight change in alignment of an interstate route to a 90° turn in an urban street. It is at these locations that the engineer must determine an economical and effective means of eliminating or substantially improving conditions without straying too far afield from the basic principles of signing and marking.

Where reconstruction is not feasible, problem locations in Virginia have been attacked through the use of king-size standard shoulder signs, special overhead signs suspended by cables or trusses, highway illumination of both the sodium vapor and incandescent types, special pavement markings and messages, and three-unit type delineator posts.

On U. S. Route 1 between Washington and Richmond the southbound lanes of the four-lane highway diverge from the northbound lanes at Austin's Run. Just in advance of the bridge over the run there is a nine-degree curve at the foot of a long, sustained grade. This location has been considered accident-prone for a number of years, in spite of numerous corrective measures including minor curve easement, super - elevation and standard warning signs and markings. Since 1940 accidents of the southbound lane had averaged about 10 per year, most of them involving vehicles failing to negotiate the curve or striking the bridge rail just beyond the P.T. of the curve. Early in 1952 the State Police reported that 32 accidents had occurred at the location during the previous 14-month period, 23 of which involved southbound vehicles, and requested that further studies be made. There had been three fatal accidents within six months.

It was noted from the accident data that a fairly large proportion of the mishaps occurred during the hours of darkness. Due to the large number of reported accidents, and their seriousness, it was obvious that some type of special treatment was justified, and necessary, if the conditions were to be appreciably improved. After careful field study it was decided that (1) more advance warning was needed and (2) additional delineation was required at the point of the change of direction and also continuing through the bridge. Accordingly, the following corrective measures were taken:

(1) An oversize (5′ x 5′) reflectorized curve warning sign and a 4′ x 4′ reflectorized 40 MPH safe speed marker were erected on the shoulder about 600 feet in advance of the curve to provide maximum target.

(2) A reflectorized striped warning sign was placed on the outside of the curve at the P.I. and the entire curve was outlined with standard right-arrow signs spaced on 30-foot centers.

(3) Approximately 300 feet of plate type guard rail was installed just in advance of the bridge to funnel traffic safely through the structure.

(4) The north approach, the curve and bridge were completely illuminated with sodium vapor luminaires.

Cost of the improvements, exclusive of lighting, was approximately $950. Rental on the 18 sodi-

um vapor luminaires is $972 a year.

Continuing checks of the accident experience at this location have been very encouraging, as evidenced by the data in Table 1.

It is interesting to note that the savings in property damage alone during the study period is in excess of $20,000.

Table 1—Accident Data, Before and After Study

	Before Study Feb. 7, 1951-April 7, 1952	After Study April 17, 1952-June 7, 1953
Total number of accidents	23	5
Number accidents durnig daylight	9	2
Number accidents during darkness	14	3
Fatal accidents during daylight	0	0
Fatal accidents during darkness	3	0
Injury during daylight	3	1
Injury during darkness	4	1
Property damage accidents during daylight	6	1
Property damage accidents during darkness	7	2
Total amount property damage	$22,590	$2,250

No special treatment was attempted at the lesser curve on the northbound lane since fewer than half as many accidents were reported here. However, lighting on the sharp southbound curve has apparently had little effect in reducing northbound accidents, so minor signing improvements, including better delineation of the curve, are now under way. In the event that the additional work does not prove completely satisfactory seven or eight more illuminating units will be installed.

Oversize Reflectorized Stop Signs

Oversize 5' x 5' reflectorized STOP signs have also been used at selected locations in Virginia to good advantage. U. S. Route 15, a north-south tourist route carrying moderate traffic volumes, connects with U. S. Route 460, a main intrastate artery, just west of Farmville to form a T-intersection. Although the routing of Route 15 follows Route 460 to the east from the junction for several miles before resuming its southerly direction, a Secondary route begins on the south side of the junction and has proven confusing to out-of-State motorists in many instances.

Many complaints were received that foreign motorists were approaching the junction from the north at the normally high operating speeds and were running the STOP sign posted at the main artery. This practice was potentially hazardous and only the relatively light volume of traffic on Route 15 prevented the occurrence of many serious accidents. The failure of the strange drivers to observe the regulatory sign also caused many to proceed on the Secondary road instead of making the proper turn.

Here again numerous, well-maintained standard signs and markings were in place, but they were not producing the desired results in regulating traffic. After study, it was decided that special reflectorized STOP and STOP AHEAD shoulder signs would be erected and a small sign island constructed in the intersection to provide a suitable location for the STOP SIGN. The total cost of the recommended improvements, including the reconditioning of the standard destination signs, was $525.

Since this was the first location in Virginia where an oversize STOP sign was used, it was decided that "before" and "after" studies would be conducted to see if the out-of-State drivers responded more readily. "Before" studies were made on Tuesday, December 12, between the hours of 10 A.M. and 3:30 P.M. and the "after" studies on Tuesday, February 27, during the same hours. While making the observance the field parties were extremely careful to locate the check stations in such a manner as not to be noticed by drivers of southbound vehicles. The volumes of the observed vehicles were almost identical, with only 22 more vehicles being checked in December than in February.

The results of the observance studies are tabulated in Table 2.

It can readily be seen that the oversize signs were considerably more effective than the 30-inch standard signs. They were particularly effective in slowing the speeds of foreign passenger vehicles approaching the intersection and, further, sharply reduced the percentage of vehicles running the STOP signs at speeds in excess of 10 MPH.

Large Overhead Signs

Virginia has also used non-standard overhead signs at special locations for several years. Prior to 1950 all overhead signs were suspended above the roadway by cables, which were connected to metal traffic sign poles or existing utility poles where permission could be obtained. While these installations served traffic reasonably well, the Department recognized that there were certain disadvantages in their use. Where it was not feasible to use guy wires, the posts had a tendency to "tow in," and, although the signs were mounted with swivels, there were cases where the constant movement of the signs by winds caused the signs to fall when couplings failed. Also, as there was some sag in all of the cables, it was extremely difficult to keep the sign level, and of course the installations did not always appear well maintained nor attract the favorable attention of the motorist.

In 1950 traffic and bridge engineers gave consideration to the development of a light-weight, economical support which would overcome the above objections, and the truss now in general use in Virginia was developed a short time thereafter. This support can best be described as a triangular cross-sectional truss frame. The members consist of ¾-inch and one-inch sections of extra strong pipe, welded to form the desired design. The frame can be prefabricated in any of the District Shops for any length up to 60 feet and in multiples of two feet. It is also easily transported to the site and may be lifted for bolting to the footings with any light rig.

To discourage climbing youngsters, or vandalism, all members between the ground and the horizontal span are carefully wrapped with barbed wire and a sheet steel apron welded around the pipe legs. A normal shoulder width is maintained through the truss and plate type guard rail is erected to protect the footings and vertical supports. A

Table 2—Before and After Sign Study

BEFORE (Standard Signs in Place)

	Full Stop	*Rolling Stop*	*Failed to Stop*
Virginia Vehicles	55%	27%	18%
Foreign Vehicles	37%	23%	40% *
Total Vehicles	50%	26%	24%

*Three vehicles cut across the left corner of the intersection and entered Route 460 at high rates of speed. Two vehicles went straight through the junction without stopping or slowing and entered the Secondary road while barely missing westbound vehicles on Route 460.

AFTER (5' x 5' Signs in Place)

	Full Stop	*Rolling Stop*	*Failed to Stop*
Virginia Vehicles	63%	33%	4%
Foreign Vehicles	41%	46%	13%
Total Vehicles	55%	38%	7%

No vehicles used intersection improperly during study.

clearance of 15 feet is obtained above the road surface at all locations.

It may be seen from the photograph herewith that the completed installation presents a neat appearance and at the same time is unusual enough to attract the attention of the driver unfamiliar with the highway. The installations are adequately illuminated at night. The complete frame is painted aluminum or dark green, depending upon the background, to obtain maximum contrast during daylight hours.

While the costs of the installations vary with the location and width of span, the average total cost, including signs and lighting, has been slightly less than $1,000. This compares favorably with the costs of the old cable and metal pole type installations.

To date, about a dozen of the new truss frames have been erected. All are on heavily traveled interstate routes and are placed in advance of intersections to guide the motorist or to warn of signalized, rural junctions having had unusually high accident rates. On U. S. Route 1 at the main entrance to the Quantico Marine Base the truss has aided materially in reducing the accident potential. At the junction of U. S. Routes 13 and 17 in Norfolk County, trusses were erected on all approaches of the four-way signalized intersection with equally good results.

Typical installations of the special destination signs may be found on U. S. Route 1 and the south end of the Shirley Freeway, and on U. S. Route 60 in North Virginia Beach, where the tourist route makes an abrupt left turn, leaving the main artery, Atlantic Avenue. The value of the special treatment at the latter location is clearly demonstrated by observations of the performance of the different types of intersection signs. When all signing was of the shoulder type, 79 of 552 observed vehicles, or 15% missed the turn on a typical day during the Summer season. "After" studies conducted a year later, upon the erection of the truss frame, revealed that only seven of 454 vehicles, or 1½% failed to make the desired turn. Six accidents, including one fatality, were reported at the junction during the 12-month period prior to the erection of the truss, while only one accident was reported in the 14-month period after its completion.

All told, there are not more than 50 installations of the various types of oversize signs on the entire 47,000-mile highway system. It is obvious that in order to retain the benefits accruing from the special treatment, very careful controls must be exercised to hold these installations within reasonable limits. Because of their unquestionable success, however, it seems certain that the continued use is assured, particularly since there is no apparent end to the ever increasing volumes of traffic on our highways.

● SPECIAL treatment of curve at Austin's Run on U. S. 1. Note oversize turn arrow, night arrows and overhead lights.

● OVERSIZE reflectorized signs comprising maximum safe speed assembly near 90 degree turn on U. S. 1 in Norfolk Co.

Equipment makes better

6-HOUR SERVICE ON A 30-INCH MAIN BREAK

STUART D. WHITFORD,
Chemical Engineer,
Oklahoma City Water Department

Here are reports from three cities showing how modern equipment has helped in the day-to-day operation of three large water departments.

OKLAHOMA City has long been aware of the advantages of using mechanical equipment where it is applicable, rather than manual labor to save time, money and inconvenience to the consumer. Many types of mechanical equipment are used by the Water Department in Oklahoma City. To mention a few, we used tractor mounted ditchers; boring machines; air tools in connection with truck mounted and trailer mounted compressors; electric tools in connection with portable power plants; front end loaders; clamshells and backhoes. I would like to mention the use of a few of these pieces of equipment.

(1) The Oklahoma City Water Department uses a ditcher mounted on a tractor for cutting trench for long services and for putting water services in ahead of new paving. Where services must be put across a paved street, a gasoline powered boring machine is used.

(2) On most of our repair trucks, a heavy duty air compressor is mounted, to furnish air to operate paving breakers, rotary drills, caulking hammers, air driven water pumps and air driven boring machines. On these same trucks, a portable power plant is mounted to furnish light for work at night and power to operate portable electric saws and valve operators.

Oklahoma City has effected a saving of $166.00 per day in repairing a leak on a 54-in. reinforced concrete raw water conduit. Before using a backhoe to uncover leaky joints, it took five days, using hand tools, to repair one of these leaks. Since the use of a backhoe was begun, two separate leaks if necessary, can be uncovered, repaired and backfilled in the same day, saving $166.00; but money saved is not the only advantage. On a break in a 30-in. cast iron water main, the line was out of service only six hours. A back hoe was used to uncover the pipe and to backfill the hole.

Front end loaders are used when dirt or rock must be loaded into a dump truck. These same front end loaders are used to remove sewage sludge from the drying beds.

● **TWO-WAY radio in the main office of the Water Works Engineer in Minneapolis permits immediate contact with field truck units, yards and crews.**

Oklahoma City has its own radio system. There are three base stations, 17 mobile units with transmitters and receivers and 8 mobile units with receivers only. There have been instances when the amount of money saved, thru the use of this mobile radio equipment, has been more than enough to pay for all the money invested in the equipment.

● **SERVICE truck, Oklahoma City, with air compressor & power plant.**

Water Department Operation

COMMUNICATIONS SPEED WATER DEPARTMENT WORK

L. L. HALLADAY,
Ass't. Water Works Engineer,
Water Department, Minneapolis, Minn.

The following information, prepared by Mr. Halladay, has been forwarded to us by Edgar W. Johnson, Water Works Engineer of Minneapolis.

THE ⅜-yd. Bantam crane which we keep at our East Yard, is a very effective piece of equipment for small repair jobs. It is mounted on rubber-tired dual wheels and gets onto the job very quickly, is easily spotted into the best working position, and digs very rapidly when used as a clam. It has outriggers for handling heavier loads. A compressor unit and guns are part of this equipment, facilitating breaking through frozen ground, pavement or other hard material.

We have used gas-driven concrete buggies on reservoir construction. These have capacities of a third of a cubic yard and a speed of 3 to 4 mph on the level; they will take a load up a 10 percent grade. The operator stands at the rear. We have used as many as six in line on a 400-ft. haul between the tower hopper and the place where we deposited the concrete. At this time, the mixer was putting out about 25 cu. yds. an hour of concrete. An advantage of their use is that the runways do not have to be very sturdy to support them. We have used them on reservoir jobs requiring up to 12,000 yds. of concrete.

A whole new communications system has recently been installed in Minneapolis Water Department service trucks to facilitate repairs and maintenance of the distribution system. Service trucks have 2-way communication with the Dispatcher as well as communication with each other within a reasonable distance. This installation promises to be a very good addition to our service truck fleet and should save the department many times its cost of operation.

We have used both light and heavy bulldozers for filling trenches, levelling off backfill on the tops and sides of our reservoirs, and removing trees and stumps. They are very versatile equipment and highly useful in all the operations of a water department.

Equipment We Find Useful in Omaha

KENNETH YOUNG,
General Supt., Const. Dept.
Metropolitan Utilities District,
Omaha, Nebr.

HERE are listed some of the most useful pieces of equipment which the Metropolitan Utilities District uses in its construction work: A Parsons 88 trencher; four tractor-mounted backhoes; earth boring equipment; four Cleveland backfiller and tamper combinations; and four Hyrda-Hammers.

The Parsons trencher is used to advantage on small gas mains and services. It is especially useful because of its mobility, for it can be moved readily from one job to another. It has been able to take care of the trenching requirements for more than one crew at a time because of this mobility.

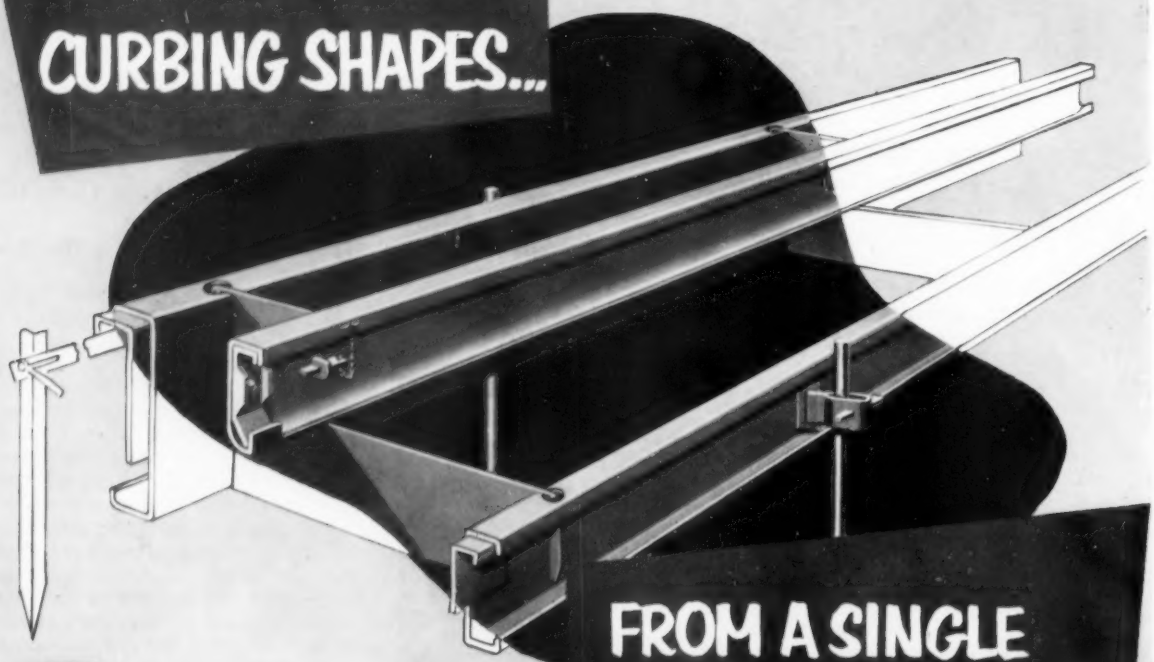
The four tractor-mounted backhoes are used to dig valve vaults, holes for joint clamping, short main extensions and to dig trenches in tight spots where a ditching machine cannot operate economically. The earth boring equipment is used where we have to pass under pavements, eliminating the need for cutting pavements.

Our four Cleveland backfiller and tamper combinations are very useful in quickly and satisfactorily compacting the backfill in gas and water main trenches. Our recent purchase of two new hydra-hammers gives us four pieces of equipment for use in pavement cutting and breaking and earth compaction.

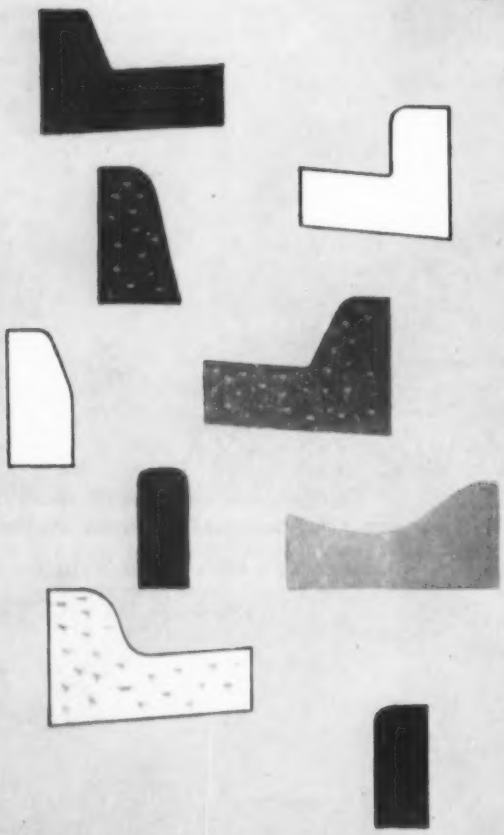
● **ABOVE: Cleveland backfiller and tamper used by Omaha Metro. Utilities Dist.**

● **BELOW: Schield Bantam truck crane trenching for Minneapolis Water Dep't.**

A CITY FULL OF CURBING SHAPES...



FROM A SINGLE SET OF FORMS!



How many curb and gutter styles in your area? If there are more than one, you should be interested in the versatile Helco Curb and Gutter Form by Heltzel.

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APWA News

AMERICAN PUBLIC WORKS ASSOCIATION
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Refuse Problems Reviewed in Chicago

Speakers cover several aspects of local problems; coordinated refuse disposal project suggested for serving Cook County areas

Over one hundred members and guests of the Chicago Metropolitan Chapter met at the Lake Shore Club March 10 to hear a discussion of the current refuse disposal problems facing the City of Chicago and the nearby communities in the metropolitan area. William Foster, Engineering Editor of American City Magazine first reviewed the nation-wide trends in the refuse disposal field and commented on a number of interesting slides dealing with modern refuse disposal practices.

Samuel M. Clarke of the consulting engineering firm of Greeley and Hansen, Chicago, discussed the problems confronting Cook County communities outside of Chicago. The magnitude of the problem, he said, indicates the necessity for coordinated planning in determining the best solution. Nearly 900,000 persons reside in Cook County outside the City of Chicago. Mr. Clarke estimated that the total refuse collected in this area during the next 20 years would average about 650,000 tons per year or 2,500 tons per working day. This quantity, he pointed out, will occupy a volume of 1,200,000 cubic yards per year in a well compacted fill, or if the fill were 10 feet deep, an area of 75 acres would be required each year. Even if all of the combustible refuse were incinerated, the volume of fill required would be about 700,000 cubic yards, or 44 acres 10 feet deep per year. The acquisition of the necessary fill sites, and the sites for incinerating plants and loading or transfer stations can be done more effectively, he said, by one or a few large bodies, than by spreading this responsibility among some 100 incorporated communities, throughout Cook County.

Coordinated refuse disposal projects of this kind have been developed to serve 320,000 persons residing in unincorporated areas in Maryland adjacent to the District of Columbia and in Nassau County, on Long Island, where the Town of Hempstead, N. Y., has constructed an incinerating plant serving about 430,000 persons. Another incinerating plant is now being constructed in Oakland County, Michigan by several communities which have joined together to form an authority eventually to serve a population of 330,100. Consideration is also being given to similar projects in Los Angeles County, California, and Bergen County, New Jersey.

Samuel M. Clarke

Preliminary studies made in 1952, by Greeley and Hansen, indicated that a coordinated project for Cook County outside of Chicago would have a first cost of about $9,000,000 and a total annual cost of approximately $1,750,000. The project would include nine loading stations, four incinerating plants and three fills.

(*Continued on Page* 128)

Offner Appoints Nominating Committee

Allan H. Rogers, Superintendent of Public Works, Garden City, N. Y., has been appointed chairman of the Nominating Committee by President Milton Offner, Secretary, Board of Public Works, Los Angeles, California. Other members of the Committee include Edward J. Cleary, Exec. Director and Chief Engineer of the Ohio River Valley Water Sanitation Commission, Cincinnati, Ohio; Edmund F. Hughes, Civil Engineer, Sewerage and Water Board, New Orleans, La.; and Harry S. Swearingen, Prin. Real Estate Agent, Dept. of Public Works, Bureau of Right of Way and Land, Los Angeles, California. This committee will present to the members of APWA a slate of officers and board members to fill the six vacancies, created by expired terms, for 1954-55.

President
Milton Offner

Vice-Presidents
Ralph C. Graham Edward P. Decher
W. A. Coolidge Kenneth King

Past President
Allan H. Rogers

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Executive Director
Donald F. Herrick

Ingram to Direct NY-NJ Training Program

The New York-New Jersey Metropolitan Chapter is now making plans to sponsor an In-Service Training Program for members of the APWA in that area. Paul R. Screvane, Chapter President and Director of Operations for the New York City Department of Sanitation, has appointed William Ingram, Associate Professor of Public Health Engineering at New York University as Director of Training for the Chapter.

The tentative program outlined by the Chapter's Executive Committee calls for two classes—one to be conducted in New York City for all New York members and a second conducted in New Jersey for the New Jersey members. Each course will cover all aspects of public works administration. Approximately 30 hours of group discussion are required to complete the 15-lesson course. The two sessions are expected to begin in the fall and continue for 3 to 6 months depending upon the amount of time each member can devote to the course.

Each member enrolling in the course will pay a nominal registration fee of ten dollars. This will entitle him to the text book for the course: "Municipal Public Works Administration" (published by the International City Managers Association); and to a certificate if he successfully completes the program.

The courses are open only to members of the APWA. Any member that wishes to enroll in this program should write to: Professor Ingram, Box 231, University Heights, New York.

How the City Engineer Can Improve His City

JOSEPH P. LAWLOR,
Mayor of Ames, Iowa

Mr. Lawlor, an outstanding engineer in his own right, presented this paper at the Fifth Annual Conference of City Engineers and Public Works Officials of Iowa. The Conference was held at Iowa State College, Ames, in March.

THE subject assigned me is "What the City Engineer May Do to Improve His City." I will discuss this subject as applying to myself, that is: "If *I* were a City Engineer, what would *I* do to improve my city."

The objectives I would work toward could be placed under two principal headings: First, I would strive to be a better engineer; and second, I would become thoroughly civic minded.

Let us list some points that would come under these headings, and then go into detail on each. First, the subject of a "Better Engineer." One of my professors in Civil Engineering at the University of Illinois had a stock question he asked every engineering class: "What is the most important hour in the day of every engineer?" His answer was "around 6 o'clock in the evening." He maintained that during that hour a man usually made one of the most important decisions of his life and that decision was: "Shall I spend an hour this evening studying something to improve myself as an engineer?" He then would point out that just one hour of study for 6 nights a week, on the average, would mean over 300 hours per year; and that even the poorest engineer, who might think at a snail's pace, was certain to gain a lot of ground during his lifetime.

I do not believe there is any branch of the engineering profession that requires a broader knowledge of so many engineering subjects than does the position of a City Engineer. The principal engineering subjects he must have a working knowledge of are: Water supply; transportation; communications; sanitation; light and power; finance; machinery and equipment; public relations; and law.

The second important target would be "I must be thoroughly civic minded." Under this heading I would include such qualifications as: Take an active part in civic affairs; talk engineering projects in the layman's language; exercise leadership; and engage in advance planning.

Now let's review each of these requirements in greater detail, starting with those under the first target.

A Better Engineer

Water supply. The most important product to a city is water. Every city must have a water supply and the amount required is constantly increasing. A few years ago, we considered 60 gallons per capita per day as a conservative figure. Now we talk in terms of 150 to 200 gallons per capita per day, including normal industrial requirements. This water must be found in streams, lakes, impounded reservoirs or wells. When the source is selected, careful consideration must be given to the amount of water that will be available from that source in the years to come. Therefore, the engineer must have good information regarding the development of an adequate water supply for his city.

If the source of water is a surface supply, it must be treated. If it is an underground supply, it may be satisfactory from the standpoint of sanitation, but such water will generally contain too much iron, dissolved gases or minerals. Therefore, I must have some knowledge of what kind of treatment is going to be required before the water is pumped into the mains for delivery to my customers. I must have some idea what this treatment is going to cost, and must exercise judgment as to the selection of the most satisfactory treatment that will result in the greatest over-all savings to the community.

Another problem is getting this water distributed adequately to the

(Please turn to page 130)

Chicago Refuse Problems

(Continued from page 127)

Theodore Eppig, Superintendent of Sanitation for the City of Chicago and President of the local Chapter, discussed Chicago's plans for meeting its refuse disposal problems. A large landfill operation in the Lake Calumet area on the south side is now the principal disposal site. All refuse dumped at this site is compacted and promptly covered with water cooled blast furnace granulated slag obtained from the steel mills. The slag, he pointed out, provides an effective insulation against the spread of flies and especially against rat infestation. It has been observed that rats will not burrow through this cover due to the sharp glass-like characteristics of the slag. The closing of certain disposal sites on the north side has forced the city to institute a system of night relay of collection trucks by direct haul to the Lake Calumet area. Most of these trucks are the large size compactor type trucks which deliver their first collection load to a rail transfer station and their second to a parking station. The loads delivered to the parking station are then relayed during the night by approximately 60 drivers to the south side disposal site at Lake Calumet.

A study made in 1948 showed that several transfer stations, and four incinerator plants of approximately 700 tons capacity are needed for the north side of the city. Two bond issues totalling $12 million have been approved by the voters to finance these plants. Mr. Eppig explained that additional recommendations for bond issues to construct incinerators for the south side will probably be made after the current program is carried out.

Harold Jensen, President of the Chicago and Suburban Scavengers Association, also spoke at the meeting and explained how the scarcity of disposal sites has made it necessary for scavengers to make long hauls and to use trucks of 25 to 30 cubic yards capacity in order to minimize their operating costs and the cost to their customers.

FILM OF THE MONTH

The Living City is the name of a new 16mm documentary film recently released by Encyclopedia Britannica Films. It shows how neighborhoods surrounding the heart of the nation's large cities have deteriorated and what is being done to rebuild such areas. The 24 minute film is based on a book by Miles Colean entitled "Renewing our Cities", published in late 1953 by the Twentieth Century Fund (330 West 42nd Street, New York—$2.50). The sale price of the film is $112.50 and the rental fee is $4.50 from Encyclopedia Britannica Films, Wilmette, Illinois.

Modern Water Storage

in the Sooner State

Shown above is a 600,000-gal. Horton® radial-cone bottom elevated tank installed to provide a dependable gravity pressure water supply for municipal service at Ada, Oklahoma.

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By installing a Horton elevated tank, you can increase the effective capacity of your system without enlarging pumping mains or your pumping plant since water in storage can be used to meet peak demands in excess of pumping capacity.

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Boston 10 ..... 1038-201 Devonshire St.	Pittsburgh 19 ..... 3246 Alcoa Bldg.
Cleveland 14 ..... 2221 Midland Bldg.	Salt Lake City 4 .. 539 West 17th South St.
Detroit 26 ..... 1536 Lafayette Bldg.	San Francisco 4 ..... 1525-200 Bush St.
Havana ..... 402 Abreu Bldg.	Seattle 1 ..... 1339 Henry Bldg.
Houston 2 ..... C & I Life Bldg.	Tulsa 3 ..... 1641 Hunt Bldg.

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Washington news

Presented in cooperation with the American Public Works Association and through the courtesy of the Washington Office of the American Municipal Association.

Federal Aid to Highways Legislation

The House of Representatives has approved a bill providing for a Federal-aid Highway Program of $800 million, an increase of $225 million over the presently authorized $575 million. Later a similar bill carrying even more money was approved by the Senate.

Features in the bill, HR-8127, (McGregor, R-Ohio) are:

(1) $270 million for projects on the Federal-aid primary system.

(2) $180 million for projects on the Federal-aid secondary system.

(3) $150 million for projects on the Federal-aid primary system in urban areas, including approved extensions of the Federal-aid secondary system within urban areas. This is an increase of $12.5 million over the currently authorized $137 million, of which no part is usable on extensions of the secondary system in areas over 5,000.

(4) $200 million for use on the national system of interstate highways, "including extensions thereof through urban areas." The present interstate highway appropriation is $25 million. $100 million of the $200 million interstate appropriation is to be distributed on a population basis. Each state gets at least ¾ of 1% of the money. "The public land state formula will still apply." The $200 million for the interstate system, including urban links thereon, is to be distributed on a 60-40 matching basis, the Federal share being 60%. This replaces the long established 50-50 formula on the interstate system. It is, however, contingent on the 2¢ Federal gas tax being in effect on September 30, 1954. This tax is now slated to expire on April 1, 1954. The Administration has asked for its extension. Members of the Senate Public Works Committee are understood to be opposed to this "linkage."

(5) Sums appropriated under the Act are for each of the next two fiscal years (1955 & 1956), and remain available for local matching for two years after the close of the fiscal year for which they were authorized.

(6) Two studies proposed by the Secretary of Commerce "and interested parties" are ok'd: They are (A) "Relative to the problems posed by necessary relocation and reconstruction of public utility services resulting from highway improvements"; and (B) "Into the feasibility of a Mississippi Valley Parkway."

Highway Construction Costs Drop

According to a report released by the U. S. Department of Commerce, Bureau of Public Roads, highway construction costs dropped to a two-year low during the fourth quarter of 1953. Based on the 1925-29 average, the composite mile index dipped to 156.9. This was 2.5 points below the previous quarter and the lowest index figure since the fourth quarter of 1951. No trend is yet discernible. During 1953, the index figures for each of the four quarters were erratic: 1st quarter—165.9; 2nd quarter—158.5; 3rd quarter—159.4; and 4th quarter—156.9.

The year's average index of 162.5 was the second highest on record, being exceeded only by the 162.5 average posted in 1952.

Modest savings were reflected in the upturn in dollar value. Based on an estimated construction expenditure of $3.243 million in 1953, the difference between the high and the low indices would amount to a saving of $170 million.

Airports Committee Favors Federal-Aid

Following the appointment of a well-qualified study commission by Undersecretary of Commerce Robert B. Murray a "new look at the National Airport program has been prepared for and at the request of the Transportation Council of the Department of Commerce."

The study group has reviewed the history and growth of the United States airport system and examined closely the role of civil airports in the Nation's air transport system. Based on its findings, the panel's recommendations, known as the Randolph Report, state that they are "convinced that civil airports are public facilities of vital importance to the commerce and security of local communities and of the Nation as a whole".

The report reads, in part: "The studies undertaken by the panel have revealed that States and municipalities and other local political units alone are *unable* to carry the capital investment burden involved in providing an adequate system of national airports. Therefore, it is the unanimous opinion of the panel that *it is the responsibility of the Federal government to give financial assistance to local governments in developing airports which are in the national interest.*

As yet, however, no funds have been requested by the Administration for Federal-aid to airports. The CAA appropriation bill has passed the House without funds or authorization for the program.

Charge for Public Works Permits in Navigable Waters

The U. S. Corps of Engineers is putting into effect new fees for licensing and permits to work in navigable waters. The new schedule of fees, for permits heretofore issued free, is for the "purpose of recovering cost of issuing permits for work in navigable waters of the United States. . . "

• • •

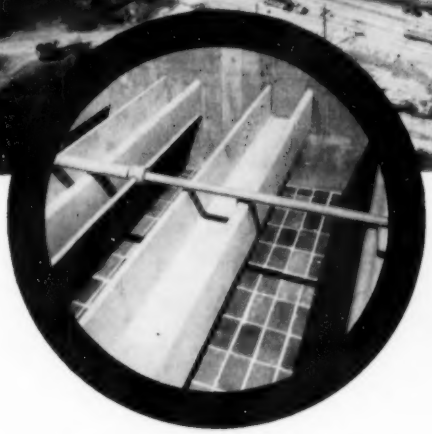
The City Engineer

(Continued from page 128)

customers. This distribution is related to the daily and hourly pumpage, so I must decide on the amount of water that should be treated and stored to meet peak demands, and where storage reservoirs should be placed. The subject of fire protection is closely related to pipelines and storage reservoirs. I must coordinate my thinking with fire risks, and the cost of insurance to the community.

The cost of pumping the water into the mains under satisfactory pressure requires me to study pumping machinery. I must select

Aerial view of new water purification plant, City of Houston, Texas. Freese, Nichols and Turner—Consulting Engineers. Brown & Root, Inc.—General Contractors.



Close-up photograph showing part of Leopold Filter Bottom installation in Houston Plant, prior to the placement of the filter media.

HOUSTON SELECTS LEOPOLD Filter Bottoms for New Water Plant

Constructed at a cost of $5,000,000, the new Water Purification Plant of Houston, Texas, combines many of the latest developments in industrial design with time-proven principles of municipal water treatment. Initially equipped for a capacity of 33 MGD, these up-to-date facilities are built to handle a nominal capacity of 50 MGD and are capable of efficient operation up to 200% of these capacities.

In addition to their use in this ultra-modern plant, Leopold Tile Filter Bottoms are giving dependable, economical service in over 250 plants with a daily capacity of more than 1¼ billion gallons. If you're looking for an economical solution to your underdrain problems, it will pay you to consider all the advantages offered by Leopold. Why not write us today for details.

Check these features of the LEOPOLD Filter Bottom:

- No possible corrosion or tuberculation anywhere in filter bottom
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- Requires only shallow depth of small-sized filter gravel
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pumps that have a high efficiency so as to keep power requirements to a minimum. The mechanical design of the pumps, and the material used in the making of them, must be such as to keep down costs of repair and maintenance.

Transportation. The people in my community must have transportation so as to move from place to place safely and rapidly. Therefore, I must have a thorough knowledge of streets, roads, curbs and gutters, and sidewalks. Some one must plan ahead for proper grades and elevation for streets, sidewalks and curbs and gutters, and, as City Engineer, I guess that's going to be my job. I don't have to be an expert bridge engineer, but a knowledge of bridge construction often comes in handy.

Another problem relating to transportation is proper drainage. I must have a good knowledge of run-off, dangers from flash floods, size, grade and location of storm sewers.

These are transportation items that the people use every day without a thought regarding what it has taken to put them there. The only time the public notices any of these transportation features is when inconveniences develop, such as a hole in the street or sidewalk, a bad grade, a flooded area or an inadequate intersection. The engineer must have a thorough knowledge of the materials required to construct and maintain every one of these projects.

Some cities have airfields. It is necessary that I know something about the design of runways, and that I cooperate with the CAA in establishing such features as direction of runways, proper grades, proper drainage, type of runway surfacing and a number of precautions involving safety.

Communications play a highly important part in modern life. Without the aid of telephone, radio, telegraph, post office and good streets, a community cannot remain active. Modes of communication are generally not a responsibility of the City Engineer. Nevertheless, I will get involved in such items as rights of way for high lines and cables for telephone and telegraph companies. These lines must be so placed as not to inconvenience the public.

This is a good time to emphasize the fact that most of my jobs are concerned with doing something for the convenience of the public and eliminating inconveniences.

Sanitation. I just mentioned conveniences and inconveniences to the public. In this respect, the problem of sanitation is a classic. As you know, it is often difficult for the public to adjust itself to the idea of spending money for sanitation, or putting it another way, spending money to get rid of something that has no value.

My problems, with relation to sanitation, might generally be divided into three principal classes, namely, the disposal of sewage; the disposal of refuse; and drainage to eliminate stagnant water which might cause nuisance.

In connection with sewage disposal, I must certainly keep up on my basic college training in the design and layout of sewer lines. I must engage in long range planning. The design of a complete sewage treatment plant is generally the problem of a professional consulting engineer; nevertheless, I must have an appreciation of the problems involved and give him every possible local aid.

No longer do we let refuse pile up in the backyard or in some open pile. Garbage must be eliminated by incineration and/or by covering. This brings the engineer into the field of contour maps and earth moving equipment.

Power and Light. The principal functions of this utility can be divided into two parts, namely: Generation of electricity; and distribution of electricity.

If I happen to be a City Engineer for a municipality that owns its own power plant, I will come closer to the electrical problems, especially the one of generating power. However, the design and construction of power plants is definitely the responsibility of consulting engineers specializing in this field. I can make some important contributions, however, in connection with general layout and equipment selection. If the power is furnished by a privately owned plant, I will have no problems in the generation of the electricity.

Power distribution and the location of high lines and transformer stations have a bearing on the safety and convenience of the citizens, and I must be prepared to offer helpful suggestions regarding rights of way for these facilities. Although the operation of a municipally owned power plant generally is not a direct responsibility of a City Engineer, his services are helpful in the field of maintenance and operation of such plants. Electricity plays a highly important part in the daily life of all citizens; therefore, since it is a public utility, it is my duty and responsibility as City Engineer to be familiar with the capabilities of both the generating and the distribution systems, regardless of ownership.

Finance. As City Engineer, I hope that I will not be expected to assume the responsibility of supervising bond issues for raising funds to finance the various public utilities.

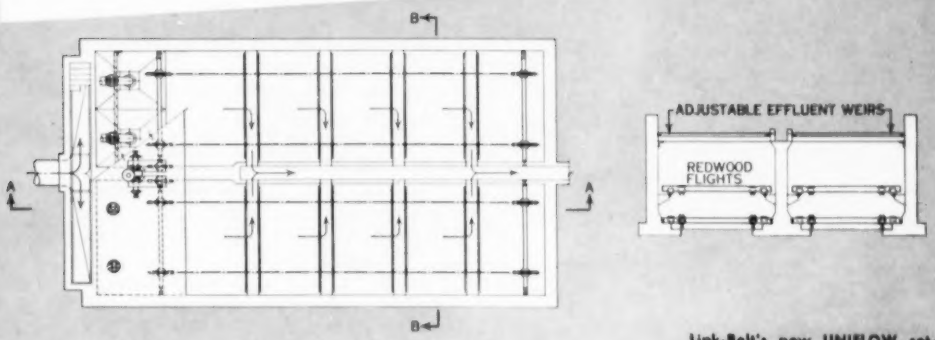
Tandem Spreaders Place Difficult Base Material

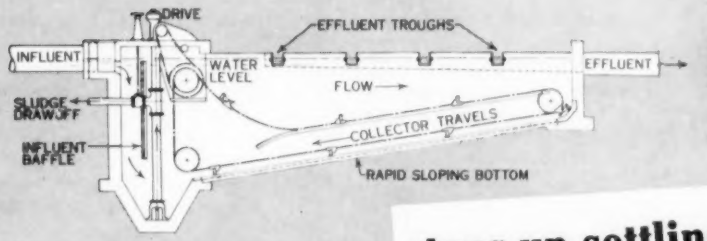
● **WORKING in tandem, Jaeger spreaders place difficult base material.**

TENNESSEE'S new specification for road base combines calcium chloride and water with crushed limestone containing a high percentage of fines. The mixture is sticky, heavy and stiff, much resembling low-slump concrete. One of the first applications of this material, made by Knoxville Construction Co., in Jefferson County, consisted of three 6-inch courses, topped with asphalt. The placement problem was met by using two Jaeger self-propelled aggregate spreaders in tandem, to lay each of the three base courses to full width. Daily production varied from 3000 to 3800 tons. Had more trucks been available, 6000 tons could easily have been handled.

VISIT OUR EXHIBIT—AMERICAN WATER WORKS ASS'N CONVENTION, SEATTLE—BOOTHS 33 & 34—MAY 23-28

New UNIFLOW settling tank





Link-Belt's new UNIFLOW settling tank can be utilized for economical removal of solids from water, sewage or industrial liquids. Uniflow tanks are equipped with Link-Belt Straight-line Sludge Collectors which will remove sludge from the tank floor and scum from the surface.

steps up settling efficiencies . . cuts construction costs

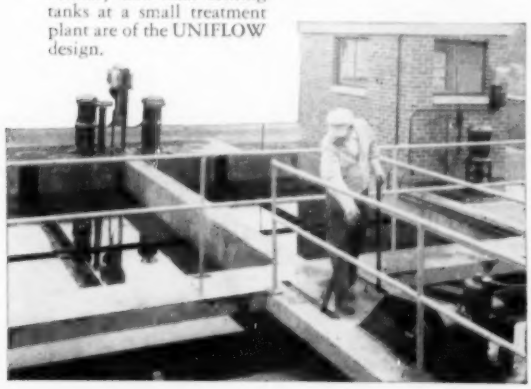
LINK-BELT development offers new economies for water, sewage and industrial liquids treatment

WITH its rapidly sloping bottom and multiple effluent weirs, Link-Belt's new UNIFLOW settling tank represents a big design advance. These, combined with the decreasing cross sectional area, provide *uniform velocity throughout the tank.*

Result: Better settling conditions . . . low overflow rate . . . uniform discharge from a large area of the tank surface. In fact, on one New England experimental installation, UNIFLOW gave practically the same efficiency in B.O.D. and suspended solids removal as a conventional tank with one-third more volume.

The new economies possible with UNIFLOW are typical of the development work constantly under way at Link-Belt. If you have a water, sewage or industrial waste problem, our engineers will work with your engineers, chemists and consultants. They'll help you get the finest in modern treatment equipment.

Primary and final settling tanks at a small treatment plant are of the UNIFLOW design.



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However, I must be qualified to prepare cost estimates on routine projects and to understand and check cost estimates prepared by engineering firms employed by the City for the design of larger projects. I must have an understanding of the various methods of raising funds, such as general obligation bonds, revenue bonds, property assessments, equitable distribution of property assessments, municipal warrants and miscellaneous tax assessments related to public utilities. A knowledge of these factors will make it much easier for me to work in harmony with other City officials.

Machinery and Equipment. The City will own various types of utility equipment, such as automobiles, trucks, street cleaning equipment, pumping machinery, motor graders and power generators. Although I will not be expected to be an authority on the design of all this machinery, I will often be called upon to be of service in connection with the operation, maintenance and the purchase of such equipment. The matter of depreciation will be of interest to me. I will want to see the City spend its money for equipment that will be most suitable for the particular task assigned.

White Concrete Slabs for Traffic Lines

JAMES YOUNG

West Allis Concrete Products Co.

AN experimental installation of pre-stressed, white concrete traffic line markers has been made on a Milwaukee street intersection located several miles from the downtown area. The slabs were produced by the West Allis Concrete Products Company of West Allis which is a suburb of Milwaukee.

Since painted street and highway traffic lane markers have been a continuing expense to municipalities, there have been some tests made on materials of a more nearly permanent nature that may be installed when the road is paved. The ideal result would be a material that would last the life-time of the highway with no cost involved other than the original installation.

Under the direction of John Tanghe, Deputy Commissioner of Public Works, and Howard Ilgner, Traffic Engineer, the City of Milwaukee has now installed two types of prestressed, white concrete lane markers at the intersection of North 16th and West Clybourn Streets. Both types were made 5 inches wide using white portland cement.

The first type was 3½ ins. deep. The method of installation was to place the prestressed marker ½ inch into the fresh concrete base. Three inches was left protruding. After the concrete base had cured the asphalt pavement was placed and finished flush with the top of the concrete marker. The prestressed sections were made in various lengths up to 8 feet. The shorter lengths were used for curves and where the pedestrian lane markers crossed the crown of the street.

The second type of prestressed marker was 5 ins. wide and 2 inches thick and was designed primarily for use in existing pavements. Grooves were cut in the asphalt in which a layer of fresh cement grout was placed. The 2-inch markers were then placed in the fresh grout. The space between the edge of the groove and the marker was filled with a bituminous joint sealing material.

It is believed that by prestressing the steel to 130,000 psi the resulting compression in the concrete will produce a lane marker that will not crack under frost action or ordinary impact.

It is too early to give a comprehensive cost analysis on the installation, but the West Allis Concrete Products Company is developing a method of manufacturing and are sure that the cost of the 3½-inch x 5-inch prestressed lane marker will be considerably less than 50¢ per linear foot on a quantity basis.

● **CONCRETE markers in Milwaukee**

Public Relations. Public utility work is performed by certain people, to serve many. Practically everything about a public utility is built around service—service to the public. People are generally quick to criticize the type of service they receive, particularly if it is slightly below par. A part of the criticism stems from the fact that the complainer does not appreciate all of the circumstances. I would consider it my duty to help citizens understand more about public utilities through the medium of public relations. People are not always wrong in their criticism and I would consider it my duty to try to understand them. In the rendering of public service, I would also be extremely careful to avoid any possibility of discrimination; people are highly sensitive about that, and rightly so.

Law. I would consider it very unwise for me to give legal advice; nevertheless, it is necessary that I reasonably understand all laws relating to our public utilities, both State statutes and local ordinances. Concerning any such laws that I could not understand, I would seek correct interpretation from the legal profession. City ordinances often require revision. I should be prepared to take part in revision of such portions of ordinances that relate to the public utilities.

Records. The City Engineer's office is a place of records. These records include maps of the entire city, maps of additions and subdivisions; property boundary lines of every piece of property in the City; the exact location of all pipelines for sewer and water and connections thereto; location and connections for high lines; elevation of all sidewalks, curbs, gutters, sewers and pipelines; location of fire hydrants; plans and specifications on all buildings and on all equipment and machinery owned by the city. I would have all of these records carefully classified and properly filed. Whenever the City employed outside consulting service for a special project, I would see to it that each report, plan and specification, bid and other data relating to every project, is properly filed in the City Engineer's office. These papers generally represent a considerable investment on the part of the city and should be carefully preserved for future reference.

Civic Mindedness

Local Organizations. Every modern American city has a number of local organizations that play an im-

Hydro-Trencher puts the squeeze on tough soil!

Working in conditions like this won't slow down the Oliver 88WT Hydro-Trencher. It digs through rocky soil, roots or hard clay fast and clean. Hydraulic down pressure does all the work. The bucket is *forced* full in the toughest going. Two completely separate hydraulic circuits keep pressure on every maneuver, even when you perform two operations at once. You've got working power all the way—to speed your work, to boost your production.

A one-man rig, the 88WT is ready to work or move in a moment. Its half-yard capacity and rubber-tired mobility cut hours and dollars from any job. Its compact design and delicate hydraulic control let you work next to pipes, walls, foundations, without fear of damage. The rugged, hydraulic stabilizer blade holds the unit level and steady, and also doubles as a backfiller blade. And here's a bonus feature, turn the trenching bucket around, in minutes you have a swing loader with all the power features of the trencher.

For more profit, put the squeeze on your trenching or loading operations with the Oliver 88WT Hydro-Trencher. Visit your Oliver Industrial Distributor for a demonstration.

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AND SWING LOADER COMBINATION

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portant part in the development of the community. Generally, these organizations are State, National or International in nature but most of their city activities are at the local level. The most important of all of these organizations is the Spiritual, the organization that teaches the principles of Christianity.

A genuinely sincere Christian community is never loaded down with situations that are bred from graft, dishonesty, selfishness, or a general tendency to disregard the principles of the Golden Rule. It, therefore, is common sense to belong to, and be active in, a spiritual organization that is constantly advocating spiritual values.

I would want to belong to a good service club, such as Lions, Rotary or Kiwanis, and the local Chamber of Commerce. The basic purposes of such organizations are to create a better understanding and a friendlier feeling between men, and to do good for the community. When I become an active member in any of them, I can certainly do some things to improve my city.

To insure that my city would continue to improve, I would be very much interested in what the *future citizens* are learning. I would attend, and take active part in, meetings of the PTA and the School Board. I would want to know considerable about the teachers who are teaching these children the conventional "three R's", plus an R for "Reasoning." I would be interested in removing so-called "qualified" teachers who have little understanding of spiritual values. I would insist that our teachers extol the virtues of the Constitution of the United States and I would never let them forget how this country fought and how our early citizens died to free us of the tyranny of the British Empire; not to foster hatred, but in order that we will not forget, and be taken again.

Such youth organizations as the Cubs, Brownies and Scouts would have my support because they do so much to develop character understanding regardless of race, color or creed.

Physical development of youth, through athletics, is highly important. They need such places as football fields, basketball courts, swimming pools and tennis courts.

Above all I would constantly advocate, and support, the election of City officials who are sincerely honest and capable. It is considered improper for a city employee to engage in politics. If two equally well-qualified men are running for the same office, it is definitely bad taste for a City employee to work for the election of either. However, if two men are running for the same office and one is good and the other of poor reputation, I would, as a taxpayer, be so bold as to go out and fight for the good one at the risk of sacrificing my position if he lost.

Talk Engineering Projects in Layman's Language. There is nothing more down to earth and common sense than sound engineering. I would find a lot of common-sense people in my community who are not engineers, but who could be of help to me if I but cultivate the art of explaining some of our engineering and utility problems in layman's language. The better these people understand my problems, the more they will appreciate what I am doing, and will lend their support to my ideas concerning what I can do to improve my city.

Leadership. I would try to cultivate leadership ability and apply it within my capabilities. I would exer-

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cise leadership by thoughtfully dividing responsibilities among those who are to help me, carefully explaining all objectives, holding meetings, setting deadline dates, calling for reports and, in general, seeing to it that everyone carried his or her fair share of the load. It is impossible to define the art of leadership in a few words, but I do know that I could do my city good by exercising correct leadership whenever I was requested to assume responsibilities of either a civic or an engineering nature.

Advance Planning. Advance planning in the growth and development of a city is a subject in which I would be interested as a City Engineer. I have placed this subject under "Civic Mindedness" rather than under the classification of "Good Engineering." Advance planning might rightfully be placed under either classification. However, it includes many subjects other than engineering. Where are the most desirable residential developments going to take place? Where is the logical place for industrial developments? What can we do to avoid the growth of slums? *After* these fundamental questions are settled comes the development of streets, water supply, sewage disposal and other engineering projects under the classification of Utilities.

The proper zoning of certain areas —residential, business and industrial developments—requires careful study by businessmen, engineers and other professional people. I would consider it my duty to introduce the engineering aspects of all subjects that come under discussion with relation to advance planning for the growth and development of the city.

Conclusion. Therefore, "What the City Engineer May Do to Improve His City" has been placed under two classifications: (1) Be a better engineer; and (2) be civic minded.

If I could do a good job in all of the tasks outlined under these classifications, it is quite certain that I would be a pretty happy and well-rewarded engineer.

• • •

County Engineer Wanted

We have a note from K. J. Kollmorgen, County Clerk of Cuming Co., Nebraska, post-office address Westpoint, saying that the county has no engineer and "Would you know of a good one to be had?"

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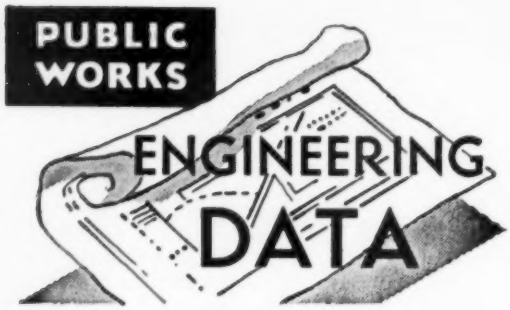

Cost Data and Cost Comparisons for Some Municipal Work

In his report for the year 1953, I. Russell Riker, Borough Engineer, Princeton, N. J., gives interesting data on costs for various municipal activities. Street and road maintenance, including repairs and maintenance, replacement of street openings, shade tree and similar work cost $2.30 per capita; the 1944 per capita cost was $.71. Street cleaning cost $1.45, garbage removal $1.37 and maintenance of sewers and sewer laterals $2.18; the total for sanitation was $5.65 per capita, compared to $3.35 in 1944. For the incinerator, the cost per person was only 65 cents.

Since 1944, the tons burned at the incinerator have increased from 3,627 to 6,230. Other interesting items of work include: 499 catch basins cleaned; 2566 cu. yds. of leaves collected (these are "compacted" for Princeton was a leader in developing a leaf loader); curb miles of street cleaned 3213; and square yards of street patching placed amounted to 4095. There were only 3 sewer stoppages in 1953 compared to 15 in 1952 and 18 in 1944.

Freezing Cast Iron Water Mains to Make Repairs

Up in New York State, Daniel Houlihan, Water Superintendent of Cortland, N. Y., has found that he can use dry ice to freeze a section of 4-inch and 6-inch cast iron main to facilitate repair work. What he has done is described in New York State's Water Works News.

Mr. Houlihan says he has frozen enough 4 and 6-inch cast iron pipe to put his mind at ease as to the danger of cracking the pipe: It doesn't crack. This is how he does it: A section of a barrel is put under the pipe to act as a cradle for the dry ice. From 60 to 80 pounds of dry ice is used and about a gallon of gasoline is poured onto the ice to hasten the freezing, which normally takes about an hour. This procedure is especially useful where there is no valve on the hydrant lateral, cases of which type are not uncommon in some of the small villages near Cortland. The hydrant lateral can be frozen, a valve cut in and the hydrant repaired. Any other procedure would require interruption of service to the whole area.

This same general principle has been used on small service lines, using refrigerator gas, which is usually freon, from a small pressure tank as the freezing agent. Mr. Houlihan says that freezing of such a small line requires only a minute or two.

Enough of the 4 and 6-inch cast iron lines have been frozen to show that damage to the pipes is most unlikely.

Why Sewer Stoppages Have Decreased

I. RUSSELL RIKER,
Borough Engineer, Princeton, N. J.

In the latest annual report of Princeton's Engineering Department, it was noted that sewer stoppages had very greatly decreased in number over previous years. Mr. Riker was asked what had caused this, and he replied as follows:

We believe that sewer stoppages have decreased principally for the following reasons:

(1) As time and budget permitted, we have eliminated those places where stoppages periodically occurred by renewing the pipe, installing by-passes and making other improvements. On this work we have used much iron and cement-asbestos pipe.

(2) We have ordered the installation of grease traps and other devices to control what enters the sewer, and we have seen to it that these are properly installed and maintained.

(3) We have used copper sulphate on certain lines where we have previously had trouble with root stoppages.

(4) Improved sewer cleaning apparatus has been used so that obstructions, such as roots, are completely removed, thus eliminating the obstruction and, in many cases, the causes that created it.

(5) The natural increase in flow in the sewers has also been a factor. Our community is now 90 percent sewered and nearly all of our lots are built on, so that there are no long runs of pipe with only scattered connections to them.

I have been somewhat concerned about garbage grinders, but there has apparently been no great rush to install them. Aside from that, much of our good fortune in having a minimum of sewer stoppages is due to the fact that we have a good sewer ordinance controlling the laying and inspecting of sewer laterals and house connections, and we are very careful to see that these requirements are fully followed.

• • •

Less Red Tape for Roads

One provision of the new Federal Aid highway bill being considered permits states to certify to Public Roads that secondary roads meet the standards followed in that state. Thus Public Roads would be relieved of checking plans, design, inspection and construction of such Federal Aid secondary roads.

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LESS WATER = BETTER ROADS

REPORTS received by the National Safety Council covering motor vehicle fatalities in a single year showed that in one out of 13 fatal accidents, a defect of the road surface was recorded.

For example, "highway defect" accidents usually result from ruts, bumps, waves, potholes or other deterioration of the pavement surface. Thus, we can cut down on such accidents by designing roads for today's vehicles and volume of traffic and by putting established materials into our highways and building them to last.

Regardless of the nature of the surfacing material used, if highways are to withstand the heavy, fast and continuous traffic of today, they must be laid on a firm, unyielding subgrade.

In practically all cases, a dry subgrade is a firm subgrade. A highway built on a foundation filled with water is literally floating and in time parts of it will sink or shift.

Draining off surface water isn't enough. Water gets into the subgrade from several sources. Some of it runs in from the surface of the road through cracks and expansion joints. Some of it soaks in through the shoulders and some from ground outside the right-of-way and from nearby springs.

This water must be removed. There is no other way to stabilize the grade permanently.

There is nothing difficult or profound about subgrade drainage. Unless there is a man-made drainage outlet, water which is trapped in the ground has no way to escape except by capillary action and evaporation. If it is trapped near the surface, it imperils the permanence and stability of any structure built on top of the earth immediately above it.

Vitrified clay pipe drainage lines can provide an outlet for nature's system of underground waterways. It removes the surplus rain water from the subsoil before it has remained there long enough to do damage. Rapid removal of water after a rainstorm is all-important.

Drainage Benefits

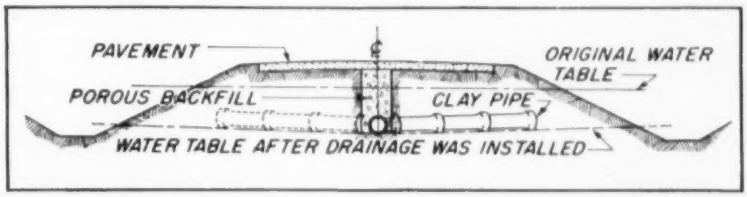
The benefits of subsoil drainage increase with time. New pipe drainage lines begin to work by draining the adjacent underground water and then gradually extend the drainage area as nature provides its own system for carrying ground water toward the pipe line. It requires little time for these natural water channels to form. Therefore, the area of drainage is quickly extended and soon reaches the maximum. With the water thus removed from the subgrade, the soil regains its supporting power and maintenance and repair costs are reduced.

Another factor to be considered is that despite gravity, water rises above the water table by capillary action. The height to which capillary water will rise depends upon the kind of soil. It can be removed by drainage.

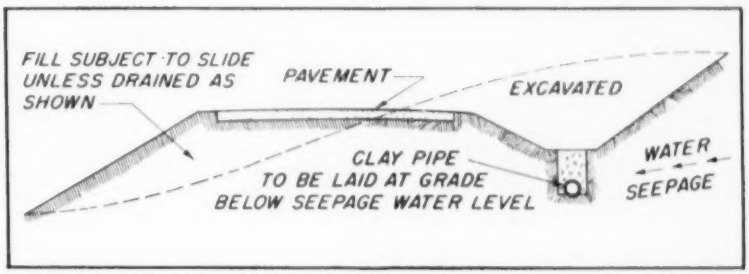
Drainage pipe lines permit an increased circulation of air through the earth and help to accelerate evaporation and dry the soil of capillary water. The only sure way to control capillary water, however, is to control the height of water table from which it rises.

Capillary water is the chief cause of frost heaves. The frost penetrating the roadbed from the surface freezes the capillary water immediately under the surface but does not go deep enough to stop all capillary motion. Additional water, therefore, rises and feeds the ice crystals near the surface, causing them to expand further. Finally the point is reached when the upward thrust of the expanding ice particles becomes so great that it erupts the surfacing. After the frost leaves the ground, the water from the melted ice softens the subgrade with resulting damage to the surfacing.

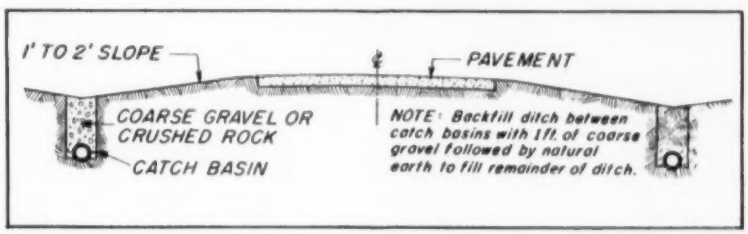
Perforated clay pipe, a more recent development, offers many specific advantages in drainage, particularly in installations where there is a need for distribution of flow along the length of the line. The



● **SHOWING** the lowering of the water table after the installation of clay pipe.


FILL SUBJECT TO SLIDE UNLESS DRAINED AS SHOWN
PAVEMENT
EXCAVATED
CLAY PIPE TO BE LAID AT GRADE BELOW SEEPAGE WATER LEVEL
WATER SEEPAGE

● **CLAY** pipe laid underneath open ditch in a cut section to lower water level.


1' TO 2' SLOPE
PAVEMENT
COARSE GRAVEL OR CRUSHED ROCK
CATCH BASIN
NOTE: Backfill ditch between catch basins with 1 ft. of coarse gravel followed by natural earth to fill remainder of ditch.

● **COARSE** gravel or rock placed over pipe to drain both sides of pavement.

perforations are placed to permit efficient collection of sub-surface waters, while restraining fine soil particles from entering the pipe. Tests have shown that by keeping the invert of the pipe free of obstructions or openings, better hydraulic characteristics for transportation of sub-surface drainage are provided. It is also interesting to note that by keeping the upper half of the pipe free from perforations, there is virtually no sacrifice in pipe strength.

Another drainage material, vitrified clay channel pipe, performs an outstanding function in efficient road drainage. Channel pipe is especially applicable around bridges and retaining walls where a great amount of surface water must be carried off in a short span of time.

(Abstracted from an article in "Clay.")

• • •

Effects of Bureau of Public Roads Policy Changes

At the present time, construction specifications are being closely reviewed by the Bureau of Public Roads. Requirements of different States frequently vary in some respects. For example, there are wide variations in the specifications for rolling high type bituminous pavements. These differences in some instances contribute to the higher costs of the same surface because the contractor's equipment and personnel requirements are increased. The added cost may not result in a proportionate improvement in the quality of the work.

The Bureau also is studying materials specifications with the same objective. The general specifications now used as a guide by highway departments, for instance, cover 9 different penetrations of asphalt cement and 40 different types and grades of bituminous materials. Only one-half of the States use the same specifications. A preliminary check indicates that on the average only about one-third of the types and grades covered within a State's own specifications may be actually used. Additional study is necessary but it appears that economies could be effected by reducing the number of types and grades, thereby reducing the cost of production and storage.

More emphasis will also be placed on efforts to extend the mechanization of maintenance and construction operations. The fact that the programming, design, construction and maintenance activities of the Bureau are now centered in the Division of Engineering should facilitate a closer correlation of the requirements of each of these phases of highway engineering. One result should be a more widespread policy of early programming for reconstruction sections of highways which now require costly hand methods to maintain. Another result should be the wider use of design features that permit the maximum use of machine rather than hand methods for construction and maintenance.

These data are from a paper by A. C. Clark at an ARBA meeting.

• • •

New Sewage Treatment Plants in Connecticut

The new sedimentation and chlorination plant with separate sludge digestion and vacuum filtration was placed in operation in Stratford last fall. The comminutor and grit chamber had been previously built. This plant has a design capacity of 4.8 million gallons per day and construction cost approximately $813,000. The new sewage treatment plant on the Town Meadows in Milford was also placed in operation late last fall. This is

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is an activated sludge plant with a design capacity of 1.2 mgd and cost $1,093,000. The East Hartford sewage treatment plant is starting operation. This plant provides primary treatment at a cost of $1,000,000.

• • •

Problems of A Resort City Include Money

"Money" said City Manager W. W. Mynatt, when asked about the unique problems of a small resort city; but he agreed that that was a general problem and discussed some of his special ones.

Gatlinburg, Tennessee, is at the foot of the Smoky Mountains and at the western entrance to the National Smoky Mountain Park. It has a normal population of about 1500 which jumps to 10 to 20 thousand on a summer week-end. There are several traffic lights on the main street but when traffic gets too heavy they are turned off and officers are used to control and direct traffic. On the other hand, in dull seasons, the lights blink as caution lights only.

The money problem is a serious one since many people come into the city for a short time and pay no direct taxes although certain facilities must be provided for them. To correct this, a lodging tax of 2 percent has been in effect about a year. The income is earmarked for recreation.

Water and drainage are no particular problems since the city-owned water supply comes down from the hills and the entire city slopes sharply to a small river. Septic tanks are used for sewage at present. However, the capacity of the central area has been almost reached. Wiedeman and Singleton of Atlanta, Ga., have prepared plans for a system of sewers and a sewage disposal plant. Bonds have been voted and it is expected that the system will be built during the summer of 1954.

• • •

Water Shortage Solved by Cross-Connection

When the Village of Hudson Falls, in New York State, ran short of water last January, an existing cross-connection was used to draw water from the Hudson River during the emergency. A General Electric plant on the banks of the Hudson had an emergency connection to the river for fire protection. This was properly constructed in accordance with sanitary engineering standards, and was on record.

As the village water supply dwindled, this cross-connection was examined and, in a dry run, the checks were removed, then replaced against the time of need. Finally, on Jan. 9, the village reservoir, which is normally supplied from springs and brooks, reached a low that prevented further water plant operation. The pumps in the GE plant were then started, the checks having been removed from the cross-connection, and water was pumped into the mains; and later the reservoir was filled.

Since Hudson River water is quite heavily polluted, a free chlorine residual of at least 2 ppm was maintained in the water pumped from the river, checks being made on the residual at hourly intervals. In addition, the citizens were notified to boil the water before drinking.

This occurrence again illustrates the value of alternate sources of supply which are known and which can be used with proper and recognized safety precautions. The District Engineer of the State Health Department, Edward Howard, reported this in the Department's Water Works News.

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Garbage Collection Practices and Costs

THERE are two basic methods used by Washington cities to determine the rate to be charged for garbage collection. These methods are (1) by volume or number of cans collected at each pickup, and (2) by a flat rate. Often, however, a city will use additional factors to increase the basic charge. These factors include: (1) classification of business, (2) distance of carry, (3) number of weekly collections, (4) flights of stairs, (5) time required to make the collection, and (6) the type or kind of garbage collected.

The method used to determine the rates to be charged varies with residential and business collection. For residential service, 82 cities (49 percent of the total) use the flat rate, while 56 cities (34 percent) base the rate on the number of cans collected. Distance of carry as a factor is used by 17 cities (10 percent). Only nine cities use flight of stairs as an additional means of determining the rate, and only two base the residential rate on the number of weekly pickups. The flat rate is used most often in cities under 5,000 population, while the charge per can collected is found most frequently in cities between one and five thousand and is the predominant charge in cities over 5,000 population.

As applied to business rates, the method most commonly used is by the number of garbage cans collected at each pickup. Sixty cities (38 percent of the total) determine their rates in this way. By systems, it leads in all classifications except the unlicensed operator. By population, it is found most frequently in cities over 1,000 population. A number of variations are used in establishing the cost per can: some cities charge the same for each can; others have one charge for the first can, and another charge for all additional cans; others use a sliding scale for additional cans.

The use of a flat rate for business collection ranks second, with 29 cities (19 percent) imposing such a charge. It is almost the only method used in cities having an unlicensed operator, and is common in cities under 1,000 population. It is not used in cities over 5,000 population. The flat rate tends to be an equitable rate for residential collection, where the volume collected is usually one or two cans a week; in business areas, however, the volume differs considerably with the type of business.

The determination of rates by business classification is found in 27 cities (17 percent). Only four cities over 5,000 population use this method. It is most common in cities between one and five thousand population using the system of municipal collection. In order to be equitable, a collection rate determined by the classification of business must be related to the volume of garbage to be collected from each type of business. This would require that the city make a survey of each business establishment in order to measure its volume of garbage.

The number of weekly collections is used by eighteen cities (11 percent of the total) as a means of charging the customer. This differs from the charge per can, in which the charge of collection is the same for each and every pickup, in that special rates are set up for more than one collection per week. Thus the per can rate for six collections per week would be lower than the per can rate for two pickups per week.

Distance of carry is a factor used by nine cities (6 percent of the total). A system of zones is established, with a rate related to each zone. In Bellingham, for example, if the can is within 10 feet of the property line, the charge for the first can is 25 cents; if it is located over 10 feet and less than 25 feet from the property line, 35 cents is charged for the first can; and if it is located over 25 feet from the property line, the customer must pay 50 cents for the first can. As with the method of business classification, this type of charge requires the city to make a survey of each individual customer (in case of dispute) to determine where the zonal boundaries are.

Only a few cities use the remaining factors as a means of determining the business rate to be charged. Six cities charge for flights of stairs (either four or six steps being designated a flight); three cities set rates on the basis of time required to collect the garbage, and only two cities have charges related to the type or kind of garbage involved.

A remarkably fine survey and analysis of current practice in garbage collection and disposal in the State of Washington has been published in Information Bulletin No. 163 of the Association of Washington Cities and the Bureau of Governmental Research and Services of the University of Washington. This was prepared by Bert Balmer, research assistant. Data were obtained from 191 of the 244 cities in the state, including 115 of the 119 having a population in excess of 1,000. The accompanying data are abstracted from Bulletin 163, but do not indicate the scope of completeness of the data therein.

Rate Variations

The resident of a Washington city who has two cans of garbage picked up once each week and who pays $1.00 for the first can and nothing for the second can, will be paying the most common rate; 45 percent of the cities charge $1.00 for the first can and 60 percent charge nothing for the second can. However, the state-wide average is 94 cents for the first can and 19 cents for the second can. The lowest average charge is found in cities under 5,000 population who maintain close control of their collection service, either through municipal operation or by a hired contractor. The highest cost is paid by a resident of a city which uses the private operator system.

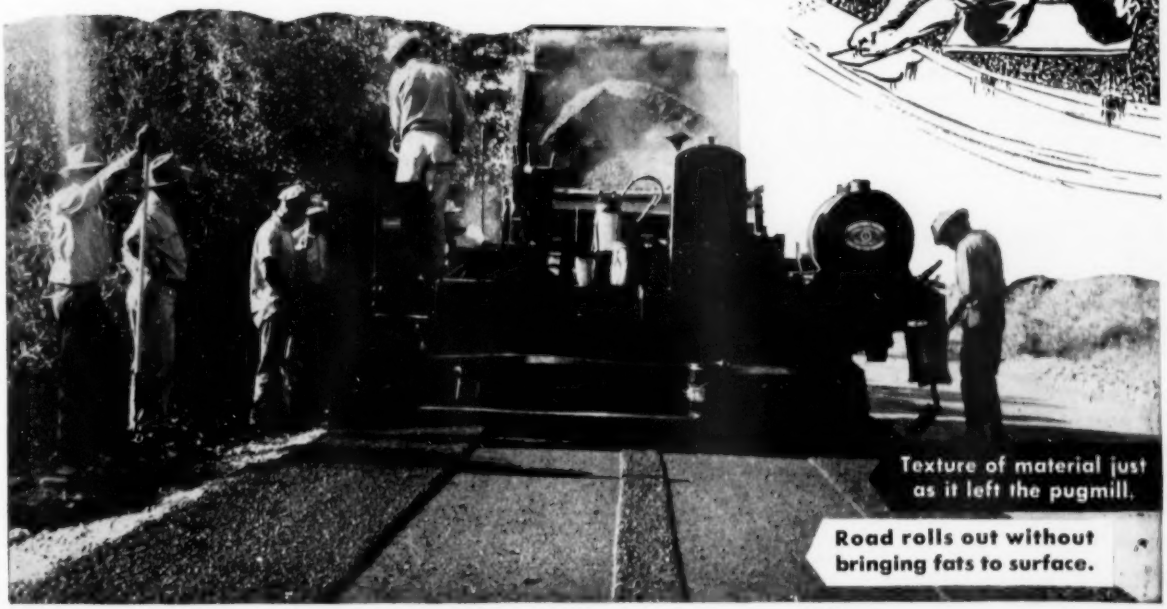
The average charge for collections from business establishments is $1.11 for the first can, $3.09 for five cans; and $5.37 for ten cans.

Factors Affecting Cost

The location of the garbage container for the pickup can make a significant difference in the cost of collection. According to a California study by Pearson and Gotaas, the labor cost for a pickup at the rear of the house is almost twice that for alley or curb pickup. However, curb pickup creates an unsightly condition which may extend throughout the day, if collection vehicles are not prompt or householders do not quickly remove the cans. Washington cities do not generally require curb pickup. Seattle, for example, specifies that the can must be placed at the rear of the dwelling. Most cities require that the can be placed in an "accessible" position; some cities make an additional charge for cans placed at varying distances from a designated pickup point.

The Washington State Board of Health prepared a formula for estimating the revenue that may be expected from the collection of garbage, basing this on 3.5 persons per housing unit; ten percent as many

NO TROWELING



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commercial establishments as residences; one collection a week for residential areas and six for business areas. For a city of 5,000 population, this would give 381 daily pickups on the basis of a 6-day week. At $1 per month for homes and $3 per month for commercial establishments, the annual income would be $22,284, or about $4.45 per person per year. This is more than the actual cost reported by 44 Washington cities. The average of the costs reported amounted to $3.15 per capita (which is believed to include disposal, though it is not clearly stated in the report). Above the $3.15 average were 23 cities, while 21 were below it. It is of interest to note that the 44 cities utilized 178 trucks for collection. Since these cities ranged from Waterville, with a population of 1,013, to Seattle, with a population of 477,000, the average of about 4 collection vehicles per city could quite probably be applied to all incorporated cities in a state.

Concrete Saw Speeds Replacement of Street Lighting Fixtures

J. LEO QUIGLEY,
Commissioner of Public Works,
Troy, N. Y.

BETTER street lighting of the business district of our City is now an accomplished fact. The new light fixtures give us a uniform brighter visibility which is a benefit to the residents of the area in both private homes and business places. The merchcant likes it because there is more business volume during the evening and dusk hours when his street is well-lighted. The shopper arriving both by vehicle and afoot, appreciates the new and brighter lighted area.

The Niagara-Mohawk Power Corporation installed 220 new street lighting units and removed 250 old standards with a total of approximately 8000 lineal feet of underground electrical conduit. The locations of the conduit presented technical and economic problems where these lines go from manhole junction boxes to the lighting fixtures under concrete sidewalk slabs, under concrete streets or under blacktop streets with concrete base.

In isolated cases the cable can be tunneled under pavement or sidewalk for short distances, but usually the pavement or sidewalk must be removed, then replaced after installation of cable and backfilling. The width of trench is the minimum that can be excavated so when the common breaking methods are used in the case of concrete sidewalk slabs from 5 feet to 15 feet wide, it is necessary, because of fracture, to replace the entire slab. It becomes very expensive where a nominal 15-inch trench requires the replacement of 5 to 15 sq. feet of concrete sidewalk per lineal foot of trench.

With this thought in mind, it was decided to saw the minimum area to be removed. This was accomplished by employing a portable, gasoline-powered concrete cutting machine. The unit was powered with a heavy-duty 13½ horsepower engine. The saw blade could be mounted on either left or right hand side which provided the flexibility necessary in some of the cuts. Since water is necessary as a coolant to the saw blade, the machine had a self contained water tank with attachments for optional outside source such as ordinary water outlets, fire hydrants, etc. The entire unit is mounted on four rubber tired wheels, balanced for easy maneuverability. For our application, the machine is guided by hand and cut two inches deep at the average rate of two feet per minute. The saw blade is a thin circular, high-grade steel disc approximately ⅛ inch thick with crushed diamond particled impregnated with special sintered metal powders located around the periphery of the rim.

Since the maximum depth of cut required did not exceed four inches, a 12-in. diameter blade was used. However, larger diameters are available for deeper cuts. The method used required only 1¼ sq. feet of replacement sidewalk per lineal foot of trench.

Where the location was under the concrete sidewalk, by keeping next to the curb, one cut 1½ to 2 inches deep in the concrete was sufficient to create a weakened plane, as when using a glass cutter for cutting window panes. Breaking was then done with jackhammers.

Under concrete streets the operation was identical except that two saw cuts, one on each side of the trench, were needed. Where blacktop was laid over concrete street, two saw cuts were made, each cutting all the way through the blacktop and into the concrete base about 1 inch.

The advantages of sawing before breaking are its economy. Also the repair is very sound, making a beautiful completed job, and subsequent maintenance of pavement is eliminated. The clean edge made by sawing leaves the replacing slab, either concrete or blacktop, a clean straight joint from the surface and the section of the old slab below the saw cut, being irregular, provides a roughened edge so there is an interlocking of aggregates when the new slab is poured. In the event inspection or repairs of the underground electrical installations are required, the replaced sections can be again removed without disturbing the balance of the concrete.

Where the replacement was on blacktop street with a concrete base, the concrete portion was poured in early winter. The blacktop was placed in the spring. The joining of the old and new concrete was so strong that winter traffic over the bump did no damage.

In a few isolated cases the sidewalk was broken out without the saw cut. This left a spalled irregular surface edge. In all cases the property owner requested that the edge of the trench be re-worked with the saw the same as his neighbors. In business sections, the use of air-hammers without first sawing was prohibitive due to disturbance caused by vibration being transmitted to store fronts. Without first sawing, the vibration could cause the fronts to crack or break, and of course, damage must be rectified by the contractor. All new and maintenance operations of our city must be done with the interests of the taxpayer always in mind. Good public relations require equal service to all in similar cases.

With the narrow trench made possible by sawing before breaking, there was no blocking of any sidewalk during this construction. The same advantages of disturbing a minimum of sidewalk were gained in removing 250 bases for the old light standards. Both the old bases were removed and the new bases were installed by the "saw first and then break" method.

Weber Construction Company, of Schenectady, New York did the work under this contract. They used a Felker concrete cutter, Model 250, a power-driven cutter with a Felker segmented diamond wheel. Where the location was under concrete sidewalk or concrete street, the

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THERE is a common denominator found in all kinds of business from the biggest of corporations to the so-called one-man show.

That's the basic requirement that to make a profit you have to sell.

And it's a problem which is most acute for the little guy. Why? Because he is forced to be a jack of all trades. He's got to be a craftsman, purchasing agent, financier, tax expert, truck driver and, on Saturday afternoons, he's got to sweep the floors. Yes, and he has to sell, too!

If you fall into that category, it will be a comforting thought to know that there is a host of friends at your side. One is your wholesaler. He's willing to sit down and discuss ways and means for you to get more business. He maintains a display room for you to use when you want to show customers the products you are recommending.

If he's been through the mill there's one suggestion he will probably make. It sounds hard and it is. It goes like this:

Get out in the field. Ring door bells—talk to people. Tell them about yourself—about the services you are selling. Ask to inventory their plumbing—their refrigeration—their heating plants. After all, in many cases it has been a long, long time—right from the building of a house—since a man who "knew what he was doing" took a look. Many home owners have temporized with tinkering repairs of their own.

You can talk about new products—about new types of furnaces, up-to-date kitchens, air conditioning, and how easy it is to modernize a bathroom. Ask for the order. Yes, ask for the order—it's selling time!

Your manufacturer is another person who stands at your elbow. He'll work through your wholesaler to provide handy how-to-do-it tips. Wolverine does it for example. Just ask your wholesaler for copies of Wolverine's Plumber's Pocket Pal—and Want Book. And—remember—it's a good sales feature to use Wolverine tube. It's dependable, long lasting, easy to work with. You can buy it from your wholesaler!

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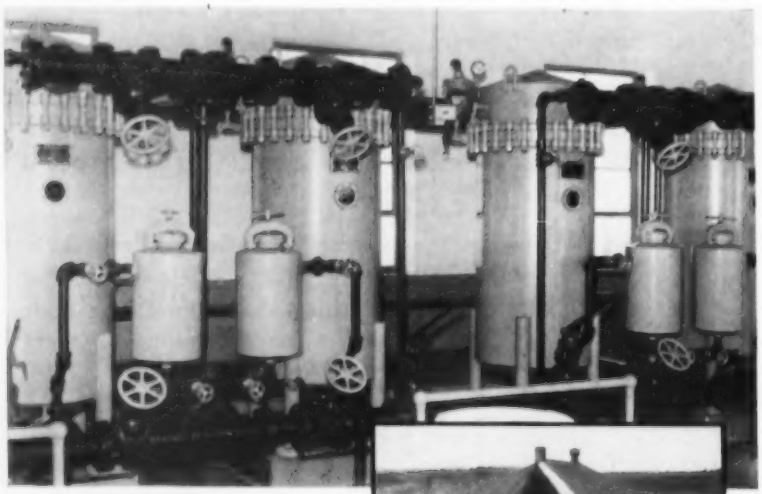
standard 12-in. diameter Felker Di-Met segmented diamond wheel was used, but for sawing blacktop pavement over a concrete base, a special 12-in. diameter Felker diamond wheel gave longer wheel life. Mr. Weber indicates that costs by breaking without sawing first would have been prohibitive because the entire sidewalk slabs would have to be replaced with resulting inconvenience and cost.

An additional useful application for this concrete cutting equipment for cities like Troy is in connection with street maintenance and installation of water, sewer and other service lines. Wherever a street has to be repaired either as regular maintenance or where it is broken and replaced, there can be no doubt that the finished street will be smoother to traffic and stronger if a saw cut is made before the old pavement is broken up and removed.

The entire project described above was accomplished to the satisfaction of this department and is a great improvement of the business district and is a permanent benefit of our city.



"DIATOMACEOUS FILTRATION MERITS SERIOUS CONSIDERATION"

In the February 1954 issue of the Journal of American Water Works Association, Mr. J. K. Fraser (Civ. Engr., Barker & Wheeler, Engrs., Albany, N. Y.) states "Where intermittent filtration must be provided and where the water is of a character that lends itself to filtration by diatomaceous earth, such a process MERITS SERIOUS CONSIDERATION."

The photo shows a diatomaceous earth filtration system installed at Tupper Lake, N. Y. In his article, Mr. Fraser tells why this 1.75 MGD system was selected in preference to a sand filter system. He also speaks about the flexibility of the system – about its quick starting characteristics – about its ease of backwashing and economy of operation.

We will be happy to send you a copy of Mr. Fraser's article "Diatomaceous-Earth Filtration in New York State" – also Bulletin 1800 describing Proportioneers Purecel Diatomite Filtration Systems. Proportioneers, Inc., 356 Harris Ave., Providence 1, R. I. Technical service representatives in principal cities of the United States, Canada, Mexico and foreign countries.

Talk with us about diatomaceous filtration at the AWWA Convention.

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Research by Chicago Bureau of Water

The Bureau of Water of Chicago, Ill., is continuously carrying on experimental work of various kinds and investigating phenomena connected with the work of the Bureau. Results of this special work are published at intervals, sometimes in great detail, in *Pure Water*, a monthly "Publication to promote in-service training among employees of the Bureau of Water, Department of Water and Sewers" of Chicago. The February, 1954 issue contains a brief summary of 41 items of the more important special work which has been completed or was under way at the end of 1953. Conclusions reached in a number of cases are of general interest, and are stated below as briefly as possible.

The settling basins when constructed were provided with equipment for continuous removal of sediment from the first third of each basin. It would have been economy to have provided for such removal from at least two thirds.

Return of sediment to the raw water had no noticeable effect on the removal of micro-organisms from the water.

Efforts to handle activated carbon is slurry form have developed many complications, but final designs are nearing completion. This will effect some saving in the cost of the carbon, and considerable saving in handling it at the plant.

Aluminum sulfate costs less in the liquid than in the powdered form—enough less to warrant providing the additional equipment required. It will be stored in tanks at the plant and pumped as needed to a small tank in the upper part of the chemical building.

Ferrous sulfate cakes when standing dry. Tests are being made on keeping it in tanks partly filled with water and pumping water up through it, which water thus becomes saturated and can be used directly. This would save in cost of handling and possibly permit use of a cheaper grade of the material.

Heavy prechlorination before filtering appears to be advantageous when pollution is high; at other times, only a moderate use is advisable.

Tests are being made on a crushed material higher in specific gravity than gravel for the two upper layers of gravel at the bottom of the filters, with the idea of preventing displacement of the gravel during backwashing.

How Sewer Manholes Are Checked for Toxic and Explosive Gases

A GAS survey crew was organized by San Francisco, Calif., in 1951 in a program to examine all sewer manholes in the City for the presence of dangerous gases. With the detection of toxic or explosive gas, action is immediately taken to find the cause or source and to remove the dangerous mixture by proper ventilation. The end results of the program will protect the sewer workers, private citizens and private property from injury or damage which would be caused by inhalation or by explosion of dangerous gases.

Crew Operations

A ½-ton panel truck is used to carry the test equipment and a crew consisting of a sewer cleaner, a laborer and an engineering chemist. The sewer cleaner drives the truck to a position alongside a manhole. The laborer is stationed in back of the truck with a red flag to direct traffic around the vehicle while the engineering chemist conducts the sampling. The sampling hose is placed in a ventilation hole in the manhole cover to a depth of approximately 6 feet. The first test made is for carbon monoxide (CO) using the portable A.C.-D.C. carbon monoxide indicator. While this test is made, a 3 x 5 file card is made out containing the date, time, location of manhole and results of tests. The second, third and fourth tests are for hydrogen sulphide (H_2S), explosive gases and oxygen deficiency, respectively. After the above tests are completed, the sampling hose is raised to within a foot from the top of the manhole and another test for carbon monoxide and explosive gases is taken. It is only necessary to make one test for carbon monoxide, but since the instrument contains an electrical driven gear pump, it is used as the first test at the 6-foot and 1-foot level merely to purge the sampling hose of the previous air sample. This saves a considerable amount of time and is much faster than purging the hose using a rubber asperator bulb. After all the tests have been completed, the cover is removed from the manhole and it is inspected for clogged pipes, sludge, dirt, loose bricks, etc.

If a manhole shows any indication of explosive gases or vapor, an investigation is made to determine what type of gas or vapor is present by smelling the air sample as it is pumped through the asperator bulb. Most chemical vapors can be distinguished from each other by their characteristic odor. Natural gas also has a very distinct odor, but it is usually masked by other odors in the sewer unless there is a large quantity of gas present.

If the explosive gas in the manhole has an odor of a chemical vapor, all the side sewer vents in the vicinity of the manhole are tested with the explosimeter to determine which establishment is discharging the chemical in the sewer. The name and address of the firm and the type of chemical present are listed on the back of the file card along with the location of the manhole.

If the explosive gas is not of a chemical nature and there is no odor of natural gas present in the manhole, then all the water meter boxes on the sidewalk in the vicinity of the manhole are tested with

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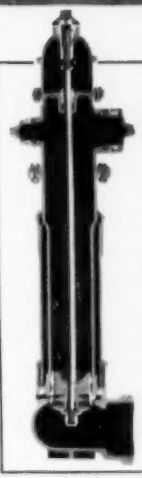
MATHEWS Means Dependable Hydrants

LONG LIFE. Mathews Hydrants have bronze parts at critical points—corrosion, rust and wear are thoroughly licked.

TROUBLE-FREE. The stuffing box plate, cast integral with the nozzle section, provides a positively leak-proof construction — water, sediment and ice cannot interfere with operating thread.

LOW-COST MAINTENANCE. Only one point requires lubrication—and that only during routine inspections.

REPLACEABILITY. A Mathews leveled in an accident can be replaced without excavating and in a jiffy. Community fire protection is interrupted only for a few minutes.



The Mathews includes every quality feature . . .

Compression type valve to prevent flooding • Head turns 360° simply by loosening bolts • Replaceable head • Nozzle sections easily changed • Nozzle level can be raised or lowered without excavation • Protection case of "Sand-Spun" cast iron for strength, toughness, elasticity • A modern barrel makes an old Mathews good as new • Mechanical-joint pipe connections as needed

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the explosimeter. When there is a leak in a gas pipe, the gas seeps through the ground and usually accumulates in the water meter boxes. The meter box with the highest explosive gas content usually indicates there is a gas leak near the area. As the gas travels through the ground, the earth filters out the heavy chemical which is mixed with the gas to give its characteristic odor. Natural gas without the chemical odorant present is practically odorless and this makes it rather difficult to detect by sense of smell.

Any manhole containing explosive gas which is suspected to be coming from a gas leak is immediately reported to the Pacific Gas & Electric Company which sends a leak crew to make temporary repairs until a more permanent repair can be made. The leak is usually repaired on the day of notification since all the leak repair trucks are equipped with two-way radio telephones.

A record is kept each day of the number of manholes tested and the results of the tests. At the end of each month a report is made showing the total number of manholes tested for that period and also the location of manholes containing explosive gases, carbon monoxide, hydrogen sulphide and oxygen deficiency. An explosive manhole is shown on the monthly report until the dangerous condition has been remedied.

At the end of each day colored pins, which represent the different gases for which tests are made, are placed on a large scale map of the City. This map is located in the assistant superintendent's office and the sewer maintenance crews are directed to look at the map and see if any of the manholes in the area in which they are working contain any explosive or poisonous gases.

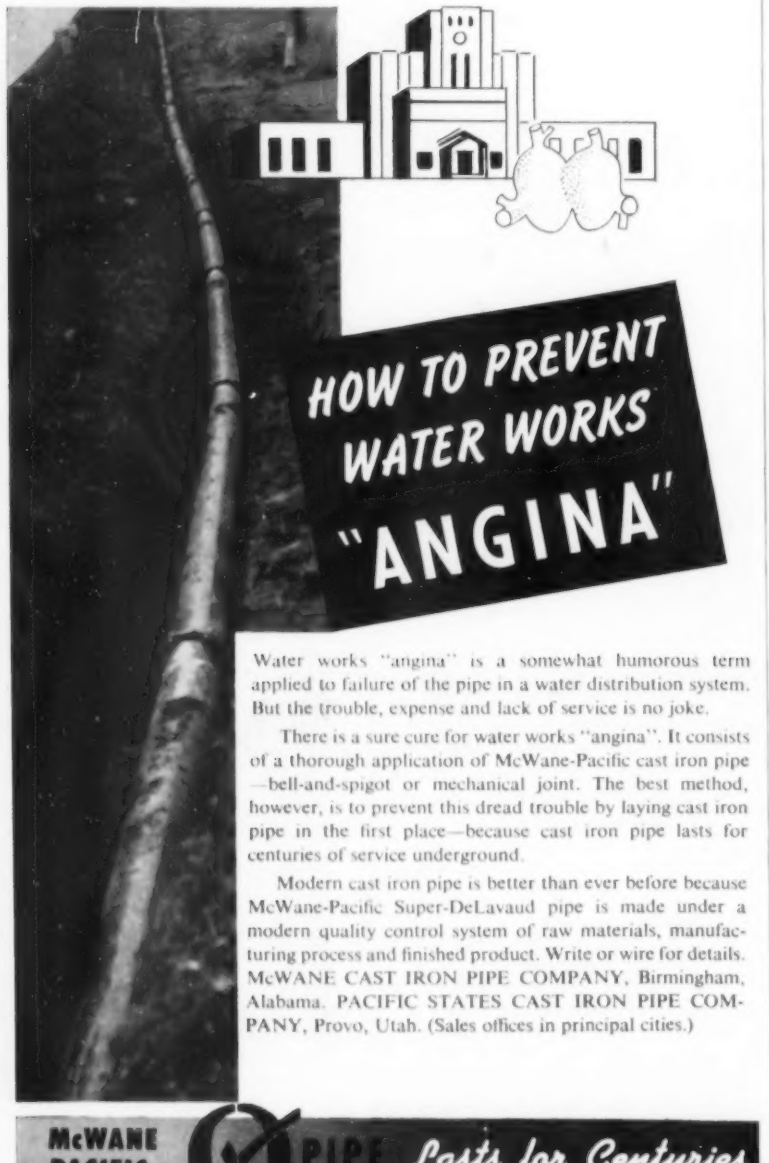
Test Equipment

The instruments used in conducting the tests are: (1) hydrogen sulphide detector; (2) colorimetric carbon monoxide tester; (3) carbon monoxide indicator; (4) explosimeter; (5) Koehler flame safety lamp; (6) a sampling line. Items (1) to (5) inclusive are Mine Safety Appliances equipment. Item (7) is a ½-ton white panel truck painted red and equipped with red flags and a flashing red light.

Safety Limits of Gases

Hydrogen sulphide is most likely to be found at the bottom of manholes since its density is greater than air at 1 atmosphere and 0°C. Its lower and upper explosive limit is 4.3-46% and it is very poisonous. The exact lower safety limit of hydrogen sulphide concentration at which it does not cause poisoning symptoms is not known, but it is exidently less an 0.005% (50 ppm). Even low concentrations (0.01%) may cause death after long exposure. Concentrations of from 0.06-0.1% can cause serious symptoms within a few minutes. The maximum concentration for 60 minutes of exposure without serious disturbances is from 0.02-0.03% and for 8 hours of exposure it is 0.002%. Large concentrations of hydrogen sulphide (0.01%) impair the sense of smell and the odor associated with this gas is of little value as a means of detection.

Carbon monoxide is combustible but will not support combustion. Its explosive limit is from 12.5-74% and is usually found near the top of the manhole since its density at 1 atmosphere and 0°C is slightly less than that of air. The maximum concentration for 60 minutes of exposure without serious effects is 0.04% and for 8 hours of exposure it is 0.01%.


HOW TO PREVENT
WATER WORKS
"ANGINA"
Water works "angina" is a somewhat humorous term applied to failure of the pipe in a water distribution system. But the trouble, expense and lack of service is no joke.
There is a sure cure for water works "angina". It consists of a thorough application of McWane-Pacific cast iron pipe—bell-and-spigot or mechanical joint. The best method, however, is to prevent this dread trouble by laying cast iron pipe in the first place—because cast iron pipe lasts for centuries of service underground.
Modern cast iron pipe is better than ever before because McWane-Pacific Super-DeLavaud pipe is made under a modern quality control system of raw materials, manufacturing process and finished product. Write or wire for details. McWANE CAST IRON PIPE COMPANY, Birmingham, Alabama. PACIFIC STATES CAST IRON PIPE COMPANY, Provo, Utah. (Sales offices in principal cities.)
McWANE PACIFIC
PIPE
Lasts for Centuries
Now's the time to mail this month's Reader's Service card.

Oxygen deficiency is a depletion of oxygen from poor ventilation or the absorption or chemical consumption of the available oxygen. Normal air contains about 21% oxygen and man can tolerate a concentration as low as 12% but the minimum concentration for eight hours of exposure without ill effects is from 14-16%. Concentrations below 10% are dangerous to human life and are likely to be fatal. The flame in a flame safety lamp extinguishes at a concentration of 16% oxygen or lower.

Methane is normally found near the top of the manhole since its density at 1 atmosphere and 0°C is almost half that of air. There is probably no limit to the amount a man can tolerate provided there is sufficient oxygen present to support life. The explosive limit of methane is 5-15%. This gas has been the cause of numerous explosions in sewers, disposal plants and mines.

Gasoline vapor density at 1 atmosphere and 0°C is almost 3 to 4 times that of air. The vapor has an anesthetic effect when inhaled. Concentrations of 2.4% are rapidly fatal and concentrations of 1.1-2.2% are dangerous for short exposures. The explosive limit of gasoline is from 1.3-6%. The fact that the lower limit of gasoline is only 1.3% has accounted for several explosions in manholes in other cities.

Natural gas mostly contains methane and smaller amounts of hydrogen (H_2), ethane (C_2H_6), propane (C_3H_8) and other heavier members of the paraffin series. For all practical purposes, the explosive limit and density of natural gas is the same as methane.

Since the explosimeter is calibrated for only methane gas, it is impossible to determine accurately the concentrations of chemical vapors such as gasoline, ether, alcohol, etc., unless one has a calibration curve for each chemical. Therefore the lower explosimeter reading for all combustible gases and vapors has been set at 20%. Another reason why this figure is used is that some chemical vapors are absorbed by the rubber sampling hose or condense on the inside wall of the sampling line. Also, leaded gasoline vapors poison the platinum filament wire and cause all the explosimeter readings to read lower than they actually should, regardless of the gas being tested.

Results of Tests

During the fiscal year approximately 7,154 manholes were tested;

Kill the ROOTS and you kill the WEEDS!

NEW DOLGE N P WEED-KILLER

—Can be used with confidence by anyone. Kills *all* vegetation by contact and translocation to weed roots; sterilizes the soil. RESULTS APPARENT IN A FEW DAYS. Spray, sprinkle or use as *dry powder*—"built-in" wetting and spreading agent works *fast* by wetting waxy surfaces of plants and inducing penetration into leaves, stems, roots. Non-inflammable, non-volatile, non-corrosive.

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—Where NO vegetation is desired . . . on walks, drives, areas close to buildings. Tends to sterilize the soil so that wind-blown seeds cannot germinate.

DOLGE E. W. T. 40- 2, 4-D SELECTIVE WEED-KILLER

—*Will not harm good lawn grasses*, but kills dandelions, plaintain and other broad-leaved noxious plants in turf.

Write for Dolge booklet on chemical weed control, and see your DOLGE SERVICE MAN for practical weed control advice.

Ask about **SOLEXTO** Kills grubs of turf insects —one application protects lawns for years!

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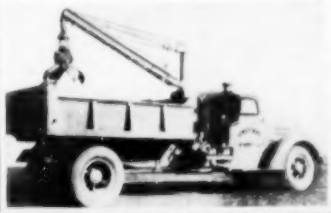
With Hook, Grabs, Clamshell, Electric Magnet, and other available accessories, ***KRANE KAR*** speeds Construction, Maintenance, and Repair Operations . . . transports machinery, lays pipe, sets poles . . . handles scrap, curbings, sand, gravel. Self-stabilizing without jacks or outriggers.



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871 manholes, or 11.4%, contained explosive gases in concentrations from 3 to 20% which were not considered dangerous; 101 manholes, or 1.4%, contained dangerous concentrations of explosive gases over 20%; 79 manholes, or 0.9%, contained concentrations of carbon monoxide below 0.02%; and 14 manholes indicated a deficiency of oxygen. In all tests, only one manhole showed a slight trace of hydrogen sulphide.

These data are from the excellent annual report of the Department of Public Works of the City and County of San Francisco.

Effect of Polyelectrolyte on Soil Porosity

Effects produced on the filterability of Florida soils by the addition of polyelectrolytes were studied by Jorge Hayn, a graduate student at the University of Florida under the supervision of Prof. Thomas Furman. This information is from the Sanitary Engineering Quarterly of the University.

The study was undertaken in an effort to answer the following specific questions:

1. Does the addition of polyelectrolytes to bank-run sands and clay soils common to Florida increase the rate at which water will percolate through these materials?

2. Is the character of soil, as measured by a sieve analysis, changed by the addition of the polyelectrolytes?

3. How long will the soil aggregates, which are held together by the action of the polyelectrolytes, resist disintegration by a constant flow of water?

4. Would the addition of the polyelectrolytes to the bottom and side areas of a specific tank drain field trench increase the rate of absorption?

Tests were conducted in 4-inch glass cylinders on seven types of Florida soils ranging from a fine clay-free sand to soil with clay content of approximately 10%. The results indicated that the addition of the polyelectrolyte does increase the rate of percolation through the soils. The percolation rate through clay-free sands was increased 100 to 500 percent and the percolation rate through clay soils was increased 1000 to 2000 percent.

Sieve analyses did not indicate any appreciable change in the character of the material.

A laboratory test in which water, at a constant head, was allowed to percolate through a sample of soil treated with a polyelectrolyte indicated that the effective life, measured by the length of time a high percolation rate was sustained, was weeks or months, rather than years.

A field experiment in soil containing 10 percent clay indicated that the percolation rate through a standard test hole was doubled when a 3-inch section surrounding the hole was treated with a polyelectrolyte. Treating a 6-inch section increased only slightly the values obtained from the 3-inch treatment. At the current retail price of the material studied (approximately 25% active ingredient) the cost of polyelectrolyte alone would increase the cost of the trench by approximately $3.50 per foot which would be prohibitive in most cases.

• • •

A Really Bad Soil

Engineers who think the soil they have is the worst possible one to work with may be consoled by reading a soil description by E. W. James in his paper "Construction at the Inter-American Highway" in A.S.C.E. Separate No. 350.

"In road construction we met with bad soils that bothered us for a

make fast permanent PIPELINE REPAIRS

HI PRESSURE LUG compounds full pressure of bolt to compress the gasket around the pipe. This prevents bending, assures "first try" success!

RUBBER SEAL has large matched teeth that intermesh easily, provide perfect seal against leakage.

BAKER CIRCLSEAL CLAMPS

REPAIR FULL BREAKS QUICKLY in steel, cast iron and asbestos-cement pipelines with Baker CirclSeal Clamps*. They provide a fully cushioned wrap-around for the pipe—are light in weight, easy to handle. A compounded rubber gasket with intermeshed teeth supplies a complete seal even on out-of-round and damaged pipe.

No shut down for repairs is needed when you use Baker CirclSeal Clamps. They can be installed in wet ditches without draining and filling of the line during repair work. Just wrap the CirclSeal Clamp around the line and draw up the bolts. *HiPressure Bolts never bend!* Due to the flexibility of the CirclSeal Clamp, your pipeline is repaired and *insured* against recurrence of breakage due to line strains.

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Construction: 36 ounce heavy Copper or 20 gauge Stainless Steel sleeves; ½" CadPlated or Silicon-Bronze bolts; the new HiPressure Lug which eliminates bolt bending and holds higher line pressures; special intertoothed Lastite rubber gasket to insure constant gasket thickness on uneven pipe

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time. The entire region through which we were building was composed of volcanic and lateritic soils. Some of the volcanic deposits are excellent material being burned, vitrious and non-slaking Clinker, scoria and lava may be highly porous but this did not bother us because there is never any ground frost. In Nicaragua, Costa Rica, Guatemala and sometimes in Panama, however, we found an extreme form of gumbo known in Nicaragua by the Indian name of Sonsocuite. In its natural state underground and water saturated it has a consistency reminding one of liver. It is so fine grained it resists evaporation except for a thin layer at the surface where it dries out hard. Its shrinkage is high but the lozenges into which it cracks are rather large owing to the tenacious plasticity of its interior. The sides of the cracks, reached by the air caseharden just as the surface does. To stabilize such a soil by admixtures is practically impossible. Our soil engineers advised us that it would take 90% admixture to give it stability and probably nothing short of breaking it up into small blocks, drying and pulverizing it would make it possible to mix with sand or other good volcanic material. In some places along the shores of Lake Nicaragua it occurs in deposits six to fourteen feet deep for a distance of several kilometers. To relocate to avoid it was not desirable because we wished to serve the towns along and near the lake shore, and to remove it was impracticable. We did the next obvious thing and tried to blanket it. This we succeeded in doing by raising the thickness of the blanket of the best select material we could find progressively to 18 inches. By carrying the blanket down the slopes we finally have secured a grade that promises to remain stable.

Another troublesome detail about Sonsocuite is that it sometimes occurs in cuts in the form of small lenses, tapering out to nothing in a short distance. Before our experience was complete we neglected these small deposits and mingled them with the surrounding good soils in the process of grading. The result, as one might conclude from the soil engineer's statement, was that these small amounts of Sonsocuite seemed to contaminate the whole mass, and we had frequent base failures in consequence. Of course, the remedy is to waste all such deposits when they are encountered."

Red Stop and Yield Signs

The use of the red background, instead of the standard yellow, on stop signs is steadily increasing.

Stop signs which require a complete stop, whether there is intersecting traffic or not, are being replaced by signs requiring traffic to yield right of way at the intersection. If there is no traffic a complete stop need not be made.

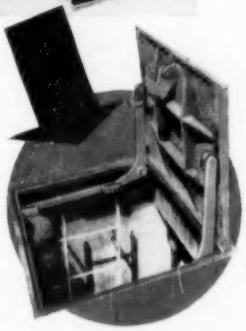
Both of these statements are based on observations by Public Works editorial staff members mostly in the East and Southeast.

Diversion of Highway User's Tax Dollars

More than $3.5 billion in highway user tax revenues collected by the states since 1924 have been diverted to non-highway purposes, a compilation by the National Highway Users Conference discloses. Diversion still continues to be a serious problem, especially in some states with acute road needs, but the over-all magnitude is gradually being reduced as states discontinue the practice.

WACHS Safety Vault Covers

for Valve, Meter, Transformer and District Governor Vaults



Features

- One man can quickly raise cover with ease and without danger.
- Cover can not drop into vault or slam to cause injury or damage.
- Cover can be opened from the inside of the vault by one man—an added safety feature.
- Positive tamper proof lock that cannot be opened unless key is used.
- Open cover stands in upright position indicating that manhole is open.
- Unobstructed 30" square opening gives ample room for installation and servicing heavy equipment.
- Heavy duty for heavy traffic—cast iron frame and ribbed steel cover both machined for accurate fit to eliminate rattle.
- Moisture resistant, heavy cast steel levers and linkage with stainless steel pins in "Oilite" permanent oiled bronze bushings for long trouble-free service.
- Complete counterbalance structure protrudes less than 6" from the wall.

WACHS NATIONAL PIPE SAWS

Make Fast and Accurate Cuts on 10" to 48" Cast Iron and Steel Mains

Features

- Minimum Pipe Line down time.
- Cuts under water in flooded ditches.
- No broken pipe, milled cut.
- Thor Air-Powered, no flames near pipe.
- Set-up time about 15 minutes.
- Portable — weighs only 315 lbs. Two men can carry and set up unit.
- Small excavation—only 16" clearance needed.
- One machine cuts all pipe sizes from 10" to 48".
- Only two adjustments necessary for size changes.
- Cuts 24" pipe in 24 minutes — 36" pipe in 36 minutes, etc.

16" clearance between 24" mains

Write today for descriptive folder and engineering data on this new labor saving saw.

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Report on Sanitary Engineering Research

RESEARCH by the Public Health Service Environmental Health Center with respect to water pollution has been directed primarily at obtaining an understanding of (1) the importance of aquatic organisms in natural purification processes; (2) the effects of pollutants on fish life; and (3) the persistence of viral organisms and organic chemical pollutants in surface waters. Studies were directed toward the attainment of more adequate understanding of the role and value of aquatic organisms in the natural purification processes in streams of moderate size, and in a better definition of organisms indicative of pollution. Studies on Lytle Creek have indicated that sewage pollution has resulted in the growth of significantly larger and more numerous creek chubs at all downstream points at which fish could exist. These fish are more tolerant to pollution than bass and other game fish.

Experimental studies of the influence of pH on the toxicity of the nickelo-cyanide complex to fish were completed. The studies show that toxicity of the complex increases well over a thousand fold as the pH decreases from 8.0 to 6.5. A comprehensive critical review of literature on the toxicity of metallic salts to fish was completed.

Studies of the survival of Coxsackie virus indicated that in stored sewage at 20°C., there is marked reduction in the amount of virus present after 20 days, and no virus could be detected on the 61st day of storage. At temperatures of 6-8°C., inactivation of the virus was less rapid. Inactivation of the virus in Ohio River water at 20°C was approximately three times as rapid, while autoclaving of the river water destroyed its virus-inactivating properties. Control studies with distilled water indicated that the virus could still be detected in water stored at 6-8°C for 142 days. The Coxsackie virus is quite resistant to a variety of agents. Penicillin, streptomycin, chloromycetin, viscosin, 1% Roccal, and 5% Lysol have been found to have little effect on the virus.

Studies have been continued on the persistence of particular organic compounds in surface waters. Lignin, in various industrial forms, is discharged into receiving streams as a waste product of pulp and paper making operations. It was found to be very stable under normal conditions with approximately 50% of an initial dose of 10 ppm persisting after 22 weeks of observation in Ohio River water at 22°C in the absence of light. On the other hand, neutral hydrocarbons, including motor oil, showed substantial oxidation in the presence of fresh sewage.

Water Supply

Program objectives on water supply research were aimed at the evaluation and study of (1) methods of removing radioactive materials from water; (2) survival of pathogenic fungi in water; and (3) methods for control of algal growths.

Detailed experimental work on both a laboratory and pilot plant scale was carried out at the Oak Ridge National Laboratory on the efficiency of removal of radioactive materials from water by conventional water treatment processes. Completed studies were made with water solutions containing several mixed fission product wastes and

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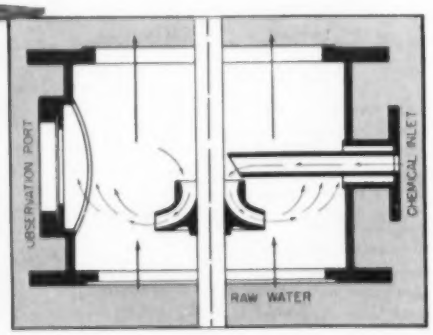

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22 individual radioisotopes. Treatment processes evaluated were conventional coagulation and sedimentation, filtration through various media, ion exchange, lime-soda ash softening, phosphate coagulation, addition of clay, excess lime-soda ash treatment, and addition of metallic dusts. The conventional treatment processes used by most municipal waterworks are of limited effectiveness in removing radioactive contaminants.

The results of preliminary studies on the survival of *Histoplasma capsulatum* in water have shown that, under the conditions of experiment in sterilized Cincinnati tap water and sterilized Ohio River water, stored at 5°C, 20°C, and 37°C, yeast cells and spores can survive and even multiply for at least 40 days.

It has been demonstrated that purified suspension of Coxsackie virus in water can be inactivated by chlorine. Inactivation times are dependent on temperature, hydrogen ion concentration, and chlorine concentrations. In general, 7 to 46 times as much free chlorine is needed to achieve comparable kills of Coxsackie virus than to kill *E. coli* cells.

Studies of algal growths as related to water supplies were intensified during 1952-1953. Colored drawings of algae selected according to their relative importance in water supplies have been made preparatory to publication of a manual for identification of algae.

Fifty different chemicals have been screened for their algacidal properties. Tests against 31 cultures of algae were made for some of the more promising algacides at concentrations covering a range of 64 to .004 ppm. The algacidal effectiveness of the chemicals tested varies considerably from one species to another.

Waste Disposal

Waste disposal research has been concentrated on (1) evaluations of waste characteristics from industry and methods of treating industrial, municipal, and individual household wastes; and (2) study of new methods of treating wastes.

Comprehensive industrial waste studies were completed at a petroleum refinery plant, a chemical plant producing the ingredients for synthetic rubber production, a kraft pulp and paper mill, and a plant engaged in the destructive distillation of seasoned pine wood. In each instance the sources, volumes, characteristics, and available methods of treatment of component wastes were studied and potential methods for control and reduction of the wastes was explored.

During the year industrial waste guides for the use of state control officials and technical industrial personnel were prepared for blast furnace, steel rolling mill and wood naval stores wastes.

An evaluation study of the direct recirculation of a high rate trickling filter was made at a sewage treatment plant in Newberry, S. C. Results indicated that the effluent from this plant was equal to or better than that which might be expected from a conventional plant of this general type, thus offering possibility of design economy for future municipal installations.

Study of the application of biochemical processes to the treatment of radioactive wastes was continued both in cooperation with the Atomic Energy Commission at Los Alamos, New Mexico, and at Cincinnati, Ohio. In a study of the behavior of phosphorus[32] in a simulated laboratory trickling filter

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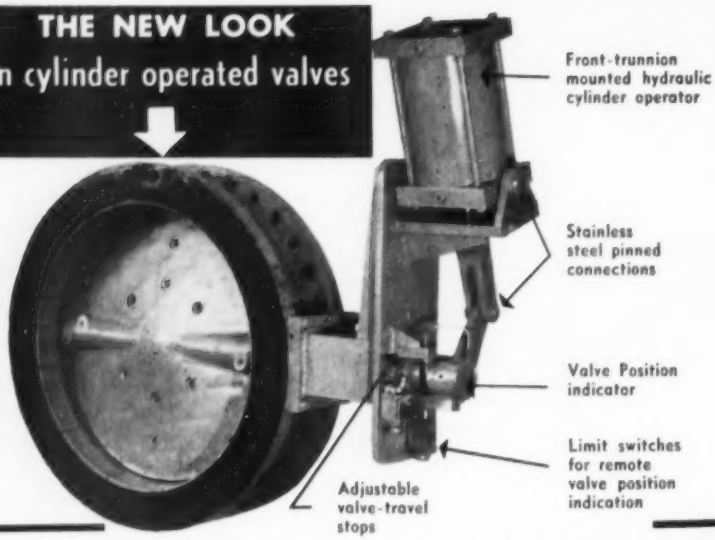
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plant, only 20% of the radioactivity was removed. A new unit is being devised to improve the simulated plant.

Field and laboratory studies on individual household sewage disposal systems were substantially completed during the year. The chemical quality of the waste water can be a significant factor in soil clogging. In particular, high sodium concentrations have been demonstrated to cause such clogging. Studies were made of the effects of an anionic detergent containing 40% sodium alkyl aryl sulfonate as the active agent on a full scale septic tank. Results indicated that this detergent, applied in the concentration to be expected from a normal family wash day use, would have no deleterious effect on tank digestion of the quality of the effluent.

These data are from the 1952-1953 report of the U. S. Public Health Service Environmental Health Center, Cincinnati, O.

• • •

Civil Defense Airstrip is Built by Evanston

Just out of Chicago is Evanston, which has recently constructed a civil defense airstrip 2500 ft. long and 75 ft. wide. This is intended for small aircraft only, such as would carry relief supplies in case of a disaster. Construction was completed in a single day, using heavy equipment.

• • •

Garbage Grinding

(*Continued from page* 112)

sized aggregate makes it mandatory to remove leaves and bits of garbage and loosen the surface from time to time.

Observations as late as December, 1953, indicated that the filter is fully acclimated to its heavy organic loading.

Secondary Settling — The surface settling rate of the secondary clarifier averaged 675 gallons per sq. ft. per day, with a retention period of 1.94 hours, both based on the first four days average flows. The volume of sludge increased sharply during the afternoon as a result of heavy organic loading of the morning and noon hours.

Digester — The effective capacity of the digester is 18,250 cu. ft., or about 3.5 cu. ft. per capita for the present population. Sludge retention time was found to be 27 to 34 days. Grit accumulation in the di-

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gester was normal for institution operation and included a small amount of sand, buttons and other inert materials. Recirculation was handicapped due to clogging of the pump with tongue depressors and rags. Temperature stratification was pronounced, the bottom sludge being about 5°F cooler than the return recirculating liquor. Gas production was at a vigorous rate.

Since it was obvious that the digester was overloaded and the sludge beds were inadequate, special disposal for the liquid sludge was provided; and, in addition, a temporary lagoon providing 30 to 45 days sludge storage was constructed. The special disposal consisted of application of the sludge to pasture and stubble crop land, using a 600-gallon trailer mounted tank. Sludge is restricted to lands where fresh vegetable crops will not be raised for at least two years after spreading.

Sludge Volume Estimates

Sludge volume estimates were prepared by six different methods to aid in the design for additional digester capacity. Observations conclusively point, however, to the need for separating the basic digestion process from the mechanical digester sludge compaction process.

Comparative estimates of sludge volume ranges show interesting correlation.

1. Using the municipal experience pointing to the need for 6 to 8 cubic feet of heated digester space per capita, considering 3 to 4 cubic feet per capita normal allowances for garbage, and adjusting these allowances to 5.5 and 7.3 cubic feet per capita based on the institution production of 0.91 pound of garbage per capita in contrast to the 0.5 pound per capita of Illinois municipalities. This suggests that 8.5 to 11.3 cubic feet per capita digester space should be made available, or a total of 44,300 to 58,800 cu. ft.

2. Applying the actual sludge volumetric study made during the survey using the production range of 5062 to 8176 gallons per day, allowing for 90 days storage and a one-third reduction of volume for supernatant draw-off using two-stage facilities. On this basis, 40,400 to 65,400 cu. ft. would be required.

3. Basing the quantity on the 0.91 pound of per capita garbage production, assuming 30 percent as total volatile solids as indicated by some municipal experiences, and employing 20 to 40 cubic feet of digester space per pound per day

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of total volatile solids for the 5200 population. This would require from 46,650 cu. ft. to 76,050 cu. ft.

4. Using the average total volatile solids removed by the plant (1888 pounds average for the last two-day run) and providing 20 to 40 cubic feet of digester space per pound per day of total volatile solids removed would require 37,760 to 75,520 cu. ft.

5. Employing an increase of the conventional provision of 3 to 4 cubic feet per capita for heated digesters, proportional to the increase of BOD over the 0.17 pound per capita, per day used for municipal design. Since the average number of pounds of BOD per capita, per day for the five day run = 0.455, the proportional increase in space requirement would be 8 to 10.7 cubic feet per capita, per day and digester capacities would have to be 41,700 to 55,700 cu. ft.

6. Use of the raw sewage volatile solids equivalent. The daily average of 2955 pounds volatile solids in the 4-day test run provided 0.568 pound per capita per day. Contrasting this with the 0.18 pound daily per capita volatile solids of domestic sewage at Jasper, Indiana, a factor of 3.15 can be applied to the usual provision of 3 to 4 cubic feet space per capita. The proportional digester space requirement then becomes 9.45 to 12.6 cubic feet per capita, totalling 49,200 to 65,700 cu. ft.

These comparisons, though admittedly crude, each provide an insight on volume requirements from different approaches. By making such a study, an understanding of the logical capacity can be reached, even where so many variables play a part. It becomes fairly obvious, also that the decision should be based on fundamental solids study rather than on the use of BOD equivalents.

Conclusions

1. The disposal of garbage by grinding at the individual institution kitchens for discharge to sewage treatment facilities shows great promise of success; the additional expenses in maintenance and operations to date do not appear unreasonable as compared with the efforts that are required for disposal by other satisfactory means. This grinding and sewage disposal operation appears to receive more support by institution management than any other method because of the simplification of administrative problems as well as the environmental improvement.

2. It is obvious that adequate planning and preparation must go hand in hand with sewage treatment of garbage wastes in order to assure logical development of the garbage grinding program. The problem is comparable with any new industrial waste loading operation. Knowledge of the institution's operations is a prerequisite to the initiation of such a program.

3. Garbage solids production studies correlate logically with present design knowledge on sludge production. Such studies can be made using practical methods and they are important to the forecast of sewage treatment plant design and operation.

4. The conventional trickling filter sewage treatment plant at the Dixon State School showed a remarkable ability to treat the garbage wastes, once the sludge production and disposal problem was met. The increase in operation and maintenance corresponds with the organic load increase. Assurance that existing pumps were reasonably efficient was essential; primary settling tank skimming was indispensable; and

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understanding care of the trickling filter was required. The trickling filter, designed for "standard rates," was able to handle BOD loadings up to 28 pounds per 1000 cubic feet of filter media.

5. Sludge from the recirculated heated digester with only about 25 days digestion time was spread on farm lands without nuisance or odor complaints, utilizing tank hauling equipment. The improvement of vegetation became apparent so rapidly that support of the farm management group was enthusiastic, primarily because sludge application serves as a conservation measure.

6. The flow studies showed that short-period flows exceeded the average daily flows by 270 percent; 90.7 percent of the total institution flow passed through the sewage treatment plant from 6:00AM to 12:00 midnight. Critical flows must be considered in the design of units; these flows corresponded logically with the regimented institution life, as well as, with its industrial operation such as the laundry.

7. BOD sewage strengths for 24-hour composite samples, including the garbage wastes, ranged from 200 to 290% of the 200 ppm BOD normally used for domestic sewage. Carbohydrate tests did not reveal unusual problems of carry-over to the secondary treatment of starches, sugars and glycogens from the hydrolysis of garbage. The high temperature of the institution sewage (appoximately 83°F) influenced sludge removal activities both with respect to functions of the primary and secondary settling basins because of rapid bacterial activity, requiring more frequent pumping and watchful operation. More efficient primary sludge removal would result if a sludge sump were provided.

8. A competent, well trained supervising operator is required to perform the necessary control tests and to meet the special problems that constantly arise in the day-to-day operation. The experienced sewage-treatment plant operator can cope with these problems; he must have assistance to enable removal of sludge loads resulting from evening garbage flows as well as for the necessary continuous maintenance to be expected.

Acknowledgements—The authors are indebted to Harry Potter, Chief Engineer, and to William Langley, chief sewage treatment plant operator of the Dixon State School, for their generous assistance in development of this study. Special acknowledgement is made of the data on garbage production, analyzed in 1949 by J. D. Williams, sanitary engineer, Illinois Department of Public Health.

• • •

Navy Gets Back to Its Old Tricks

The Governor of Rhode Island, Members of Congress for Rhode Island, the Director of Health and officials of the City of Newport and local anti-pollution interests, recently made strong representations to the Secretary of the Navy relative to the construction, now under way, of a 200-unit housing project at Fort Adams, Newport, to serve the Navy War College, the sewage from which is to be discharged untreated into Newport Harbor. The new housing was to utilize existing sewer outlets abandoned after World War II when Fort Adams was declared surplus property by the Army. It was pointed out to the Secretary of the Navy that this action would nullify much of the beneficial effect of the joint Navy-Newport Sewage treatment facilities now under construction at a cost of some $3,250,000.

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Chicago	99.9	St. Louis	98.7	Milwaukee	100.0
Philadelphia	98.3	Baltimore	99.7	Buffalo	99.8
Detroit	98.7	Boston	99.8	Washington, D.C.	98.8
Los Angeles	74.0	Pittsburgh	97.9	Minneapolis	95.8

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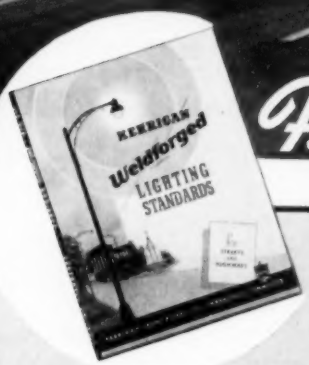

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Estimating Peak Rates of Runoff

There are two general methods of estimating peak rates of runoff in connection with planning culverts and other drainage structures; the use of an empirical formula using a coefficient to embrace the effects of all variables; and measuring the principal factors that affect runoff and determine their relations to the magnitude and frequency of peak rates. This article describes the application of the latter method to two physiographic areas—the Allegheny-Cumberland Plateau, and the Glaciated Sandstone and Shale Areas. These analyses show that:

1. The variation in the magnitude of 10-year peak rates of runoff among watersheds in a physiographic area can be satisfactorily explained by the selection of a limited number of readily attainable indices.

2. The indices that are applicable for one physiographic area are not necessarily those that explain the variations in peak rates of runoff from watersheds in some other area.

3. Even if these indices should be the same for two physiographic areas, their relation to the magnitude of peak rates of runoff would probably be different.

4. The application of the analytical procedures here developed to other physiographic areas would greatly increase the reliability of stream-flow estimates so essential for the safe and economical design of highway drainage structures.

In 67 cases out of 100 the 10-year peak rates of runoff from watersheds within the two physiographic areas here considered may be expected to vary from estimates derived through the use of the nomograph or graphs shown in the text by not more than 18 percent. This degree of reliability of the estimates may be considerably increased by the exercise of judgment on the part of the design engineer. The descriptions of the physiographic areas are descriptions of the topography, soils, or cover that apply to the average watershed within the area. These factors may vary considerably from the average for any individual watershed. The design engineer should think of the values derived from the graphs as being bounded by 18-percent upper and lower bands within which he is to exercise his own judgment. If, for instance, an inspection of a watershed shows the depth (and hence the water-holding capacity) of the soil to be considerably less than that described as average, he might be justified in increasing the value obtained from the graphs by as much as 18 percent. Conversely if the soils were found to be deeper or more porous than described for the average, he might reduce the graph peaks by a like percentage.

"Use of Indices in Estimating Peak Rates of Runoff." By the Hydraulic Research Branch, BPR. *Public Roads*, April.

Testing Large Concrete Pipe

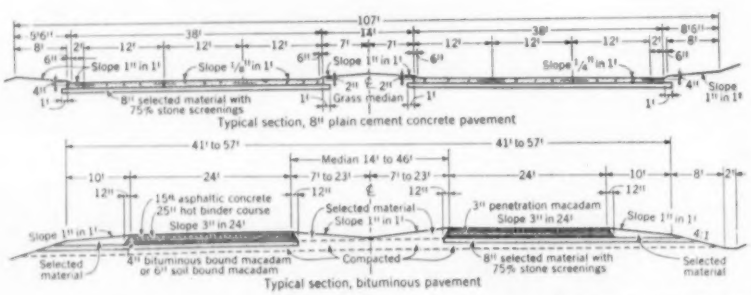
The Ohio State Testing and Research Laboratory tests reinforced concrete pipes too large for handling in the standard three-edge bearing test, by cutting cores from the pipe. Four-inch cores are cut with a portable electric drill at the rate of an inch in 8 minutes, and tested for compressive strength. A core may be taken about a foot from either end of a pipe. If this core fails in any of the requirements, a second core is cut from the other end of the pipe, on the opposite side. If this also fails, the pipe is discarded, and another pipe from the same day's run is tested similarly. If this also fails, the whole of that day's run is rejected. The holes left by the cores are plugged with the same grade of concrete with which the pipe was originally made.

"Ohio's Experience With Cores in Testing Large Concrete Pipe." *Roads and Streets*, March.

Atlanta's Freeway

Atlanta, Ga. has under construction a freeway—a $56,000,000 north and south divided expressway system providing for 4, 6 and 8 lanes of traffic, as needed, for a distance of about 20 miles. A large amount of data was collected as a basis for planning, beginning with traffic surveys in 1941 and 1944 and a parking survey in 1945. A plan was submitted by consulting engineers in 1946, which has been modified in details by later study and developments. To date, 14.5 miles are either completed or under construction.

The core of the system is the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8" selected material with 75% stone screenings
Grass median
Slope 1" in 1'
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15" asphaltic concrete .25" hot binder course
Slope 3" in 24'
Selected material
3" penetration macadam
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● **SOME of the several different cross-sections, with both concrete and bituminous surfacings, which have been used on the Atlanta Freeway project.**

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downtown connector, a half loop extending around the north, east, and south sides of the downtown area. Several different cross-sections and both concrete and bituminous pavements are used. A design speed of 50 mph was used for the downtown area and 60 mph for outlying areas. Vertical and horizontal curves were designed to provide at least the minimum sight distance recommended by the AASHO. In downtown and immediate areas the maximum grade is 6.13%; the sharpest curve is 9°. In outlying areas the maximum grade is 5.0%, and the sharpest curve 3° 30'. Where city streets cross the freeway, most of the ramps assume diamond design; one is a cloverleaf pattern. Ramps are generally 20 ft. wide, with noses reduced to 10 ft. to force vehicles into one line.

"Atlanta Builds Freeway to Relieve Congestion." By M. E. Cox, Gen'l Chairman, Joint Bond Com'n; L. H. Lyle and R. C. Tate, State H'way Dept.; and B. P. McWhorter, Div. Eng'r., B.P.R. *Civil Engineering*, March.

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Do the job faster, at far less cost than sickle bar or reel type mowers

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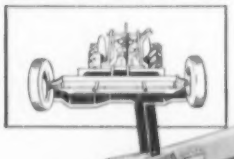

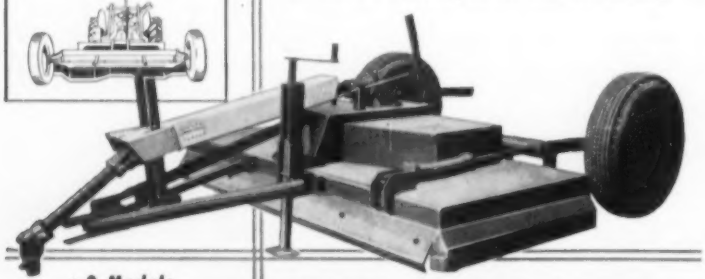

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Handling Complaints

How their counties handle highway complaints is described by a number of highway officials. All agree that receipt of a complaint should be acknowledged promptly and courteously; that an investigation at the site should be made, with the person complaining, if possible; and whatever action is taken should be explained. Some complaints are foolish, but the majority are more or less justified. Many furnish guides to the efficiency of the maintenance. Some officials express the wish that more people would complain to them instead of to each other, giving information of conditions that should be remedied if known about. Courteous attention to all complaints is an important part of public relations.

"System for Handling Complaints." *Better Roads*, February.

Controlling Asphalt Quality

In constructing the Garden State Parkway, New Jersey, special attention is being paid to guarding against contamination of tank car or tank truck loads of liquid bituminous materials. The materials will be inspected routinely in the tanks at the source. The materials are not used at once, but are unloaded into on-the-site storage tanks of 10,000 gal. or more capacity. Each shipment is sampled during this unloading and the samples checked for penetration at 77° F and for Cleveland open cup flash. The material in the storage tank will be tested by the Supervising Engineer before transfer to the contractor's working tanks. There have been cases when a truck driver has inadvertently unloaded fuel oil into an asphalt tank or asphalt into a fuel oil tank. It therefore is suggested that the contractor place a large sign on each tank telling its contents.

"Simple Procedure Against Asphalt Contamination During Shipment." *Roads and Streets*, February.

Reinforcement in Bituminous Overlays

Texas Highway Dept. in 1946 first tried using reinforcement in asphalt overlays on concrete pavement to prevent cracks in the old concrete showing up through the resurfacing. In 1953, such reinforcing was included in 9½ miles of widening and resurfacing on heavily traveled U. S. 69-96-287. The resurfacing consisted of three courses. First, a lev-

the SEAMAN MIXER *STABILIZES* Base and Sub-Base Movement

... Saves Maintenance or Costly Reconstruction

The most usual causes of base course and surface failures are weak spots in the subgrade. These can readily be prevented with a low cost stabilization of the sub-base soils. This process provides:

1. The elimination of coarse and fine pockets of soils.
2. An even "blending out" of wet and dry spots.
3. An increase in the uniformity of load bearing value throughout all the subgrade.

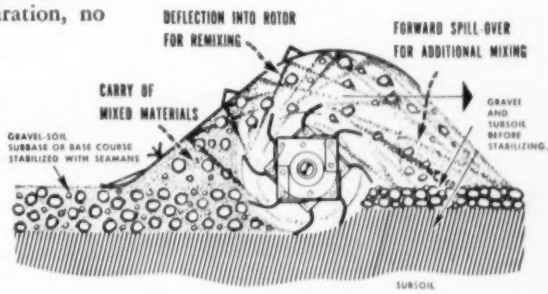
The SEAMAN Self-Propelled MIXER. 7 ft. mixing width. Gasoline or diesel powered.

If aggregates or binders are also mixed-in, the stability is greatly improved. In either case the subgrade materials are mixed, blended and mechanically stabilized for maximum support of the base.

For maximum benefit, the aggregates *of all sizes* of the base course must be mixed, blended and interlocked. Thus the finer sizes act as a soil-mortar to unite the mixture into a solid mass. No separation, no cracking, no faulting.

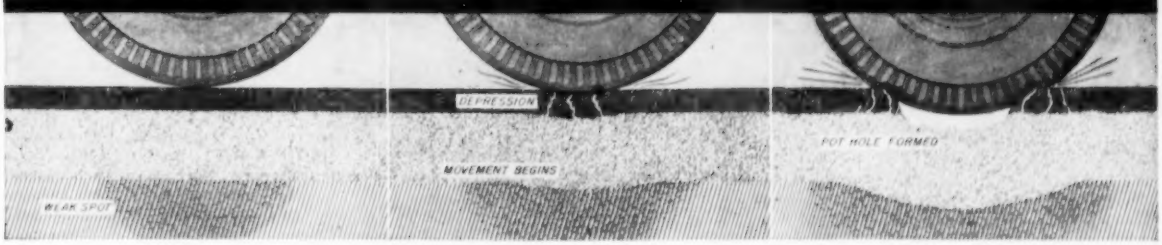
This mechanical stabilization is economically accomplished with the SEAMAN PULVI-MIXER.

Moreover, this processing also *stabilizes movement of the base and sub-base.* If weather action occurs in the sub-base, the movement it causes is wholly uniform and the base course flexes with it.


DEFLECTION INTO ROTOR FOR REMIXING
FORWARD SPILL-OVER FOR ADDITIONAL MIXING
CARRY OF MIXED MATERIALS
GRAVEL AND SUBSOIL BEFORE STABILIZING
GRAVEL-SOIL SUBBASE OR BASE COURSE STABILIZED WITH SEAMANS
SUBSOIL

A 12-page Bulletin describing the Self-Propelled TRAV-L-PLANT and the Self-Propelled MIXER is yours FREE on request. It also shows how gravel segregation occurs and how it may be corrected. Ask for Bulletin TPS. Send a postcard today.

PREVENT THIS BY STABILIZING THE SUB-BASE



Moisture has entered the unstabilized sub-base causing a weak spot. This would not occur if sub-base had been stabilized to uniformity and high density.

The expansion through freezing or the breakdown of the sub-base through the disintegrating effect of moisture is reflected in a localized movement of the materials above in the base.

Complete breakdown of the base course above the sub-base failure has started a chain reaction as more moisture will permeate the fault and establish repeated breakdown cycles along the width and length of the pavement.

SEAMAN MOTORS, INC. 266 N. 25th STREET • MILWAUKEE 3, WISCONSIN

Now's the time to mail this month's Reader's Service card.

eling course of 100 lb. per sq. yd., on which was placed wire mesh reinforcement, 6 x 6 in. No. 10 welded wire. Then a second ¾ in. course of plant mix was placed and rolled; and on this was placed and rolled another course of plant mix. The combined thickness of the three courses was about 3¾ in. Judging by the experience with previous jobs, which was confirmed by bids for the 1953 job, the cost of the mesh is equivalent to that of ⅝ in. of asphaltic concrete, or 22 ct. per sq. yd.

Such reinforcing was included in 2500 ft. of asphalt runway topping on Indianapolis Airport in 1953, the fabric being rolled out along the transverse expansion joints of the existing concrete runway; Manager Roettger think that "the 5-ft. width of welded wire fabric over the transverse joints in the older pavement, many 1½-in. wide, will maintain the continuity of the asphalt and prevent cracks from striking through the new surfacing." The reinforcement was omitted from a few joints to permit future comparison with the reinforced joints after a sufficient period of service.

"Wire Mesh in Texas Overlay Job." *Roads and Streets*, February.

Improving Quality of Asphalt

To serve best as a binder in paving mixtures, asphalt should possess adhesion and be strong and tough at all temperatures and flexible and malleable at low temperatures. Asphalts as produced by nature do not possess all these qualities to the desired degree; and any major improvement apparently can be brought about only by changing the basic composition of the material; one way of doing which is by use of admixtures. One promising material for this use is synthetic rubber, which possesses many of the quality elements lacking in refined asphalts. For several years Goodyear Tire & Rubber Co. has been investigating the use of rubber barytes for this purpose. This is a mixture of rubber latex and a slurry of barytes, dried and pulverized. Asphalt with this as an admixture has an exceptionally strong bond to concrete; a much wider range of time for placing cover stone; greater toughness; high temperature stability, even startling low-temperature ductilities. Using asphalt so prepared, higher densities can be obtained by rolling, feather-edging on overlay projects is much improved, hand raking produces less segregation, and longitudinal and transverse joints are much tighter when a cold joint is constructed.

"How to Improve Asphalt Quality." By Walter F. Winters, Gen'l M'gr, Ruberite, Inc. *PUBLIC WORKS*, April.

Other Articles

"Heater-Planer Used in Resurfacing" the New Jersey Turnpike. Roads and Streets, February.

"Airport-Runway Extension Makes a Modern Field." By R. R. Clifford, Resident Engr. PUBLIC WORKS, April.

"Pavement Modernization in Delaware." By R. A. Haber, Chf. Engr. PUBLIC WORKS, April.

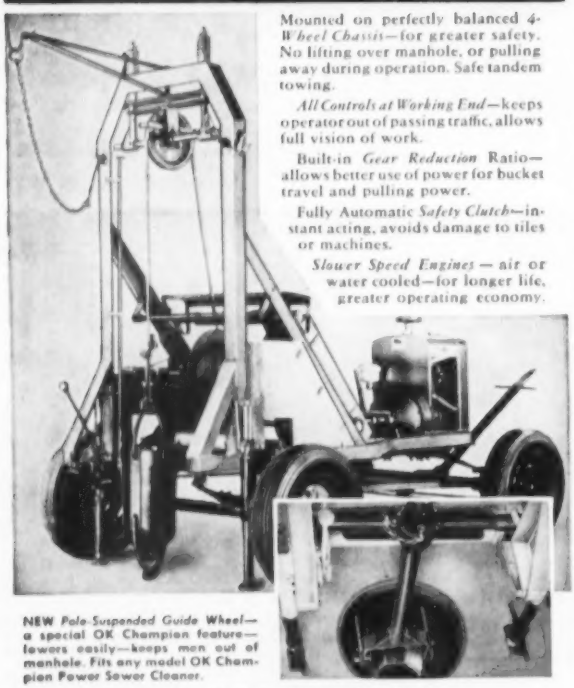
"Concrete Roads and Experience in Their Construction" in Great Britain. By A. R. Collins, Tech. Director, Cement & Concrete Ass'n. Contractors Record, Feb. 17.

"State Road Specifications, Senseless and Confusing Variations." By W. C. Peterson, BPR. Roads & Streets, March.

"Wet Weather Needn't Always Stop Your Equipment." Hints for avoiding down-time. Roads & Streets, March.

Two-way radio for highway departments; how it is used by ten counties in seven states. "Radio Saves Time, Money for Maintenance Officials." By Phil Hirsch. PUBLIC WORKS, April.

OK CHAMPION POWER SEWER CLEANERS



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All Controls at Working End—keeps operator out of passing traffic, allows full vision of work.

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Trenching Crew Makes Four or Five Main Extensions Daily

THE construction of four or five gas main extensions scattered around a major metropolitan area is just an average day's work for each of the crews operated by Hattendorf-Bliss, Inc., Cleveland, Ohio, pipeline contractors. Each job is a complete project including trench digging, pipe laying, trench backfilling and cleaning up the job. The jobs average 250 to 300 feet of trench each, for 4, 6 or 8-inch pipe, and require 10 to 20 miles of travel daily through typical big-city traffic. For this work, Hattendorf-Bliss have standardized on Cleveland trenchers for many years.

The daily schedules are carefully laid out to minimize waste time and enable men and machines to achieve a maximum of production. Scheduling calls for quick transport of all equipment from job to job, using fifth wheel low-boy trailers for carrying trenchers, backfilling machines and other equipment and material from one project to the next.

They also make efficient use of low bed dump trucks. On jobs where haulaway of spoil is required the trenchers discharge directly into the dump trucks, minimizing material handling time and manpower requirements. On many of these jobs Hattendorf-Bliss crews dispose of the haulaway problem right at the start, before they dig the trench to the full depth required. Based on previous experience on similar jobs, they accurately forecast the amount of spoil which will have to be hauled away. The trencher then starts the job by making a shallow cut the full length of the trench, loading the earth as it excavates it, directly into low bed trucks. The Cleveland trenchers cut extremely fast at these shallow depths, and their conveyors are high above ground and in best position for efficient truck loading. Because this initial cut is shallow there is no reason for concern about caving in when the trencher straddles the cut in making the final excavation for the full depth trench.

Hattendorf-Bliss schedules are timed so that machines do not stand idle for any length of time. When trucks are not hauling away spoil they are hauling material and supplies from job to job, while the low boy trailers haul equipment. Equipment is put to work immediately upon arrival at a job site and as soon as it completes its work is hauled directly to the next job.

On a typical 8-hour day in late November, 1953, under adverse digging conditions, a Hattendorf-Bliss crew with one Cleveland trencher completed this routine schedule of trench excavating, pipe laying, trench backfilling and cleaning up of 4 separate jobs at 4 separate locations:

First job was 423 feet of trench for 4-inch pipe. The second, a mile away, was 338 feet also for 4-inch pipe. A road haul of 7 miles separated the second and third jobs. The third job was for 185 feet for 6-inch pipe. The fourth and last job completed that day, 145 feet for 6-inch pipe, was 1 mile away from the third. After the fourth trench was completed, the trencher was moved another 2 miles to the next job site where it was all set and ready to go on another day's schedule when the crew arrived the next morning.

Hattendorf-Bliss' use of Clevelands is not limited to short jobs, however. For example, in one 10-hour day a Hattendorf-Bliss crew with one Cleveland trencher dug 11,000 feet—over 2 miles—of trench 19 ins. wide and 30 ins. deep for a 4-inch pipeline, a job which included putting the pipeline across a 20-foot stream.

Veteran contractors in the northeastern Ohio area, Hattendorf-Bliss report that they practically never have a damage claim. They credit this protection of lawns and sidewalks to the full crawler mounting and low ground bearing pressure of their trenchers. They are currently working 9 Cleveland trenchers and backfillers.

● **ONE of the contractor's Cleveland trenchers on pipeline work.**

• • •

Pour of Double Deck Viaduct Involves Vacuum Process

A new vacuum process, reportedly being used for the first time in American road building, is expediting the construction of the new double-deck Route 21 viaduct in Newark, New Jersey, according to the Highway Research Abstracts.

The project is part of a three-stage program for extending this route. Due to the narrow right-of-way on this section between the Erie Railroad tracks and Mt. Pleasant Cemetery, the highway department engineers resorted to a double roadway in this section.

Southbound traffic will be carried at ground level and northbound traffic will travel overhead. To expedite construction of this upper deck, the contractor is using a recently developed vacuum process for removing excess water immediately after fresh concrete is poured.

Immediately after the concrete is placed, vibrated, and screeded, a series of mats 3 feet square are placed on the surface of the new pour and flexible hose is connected from the top of the metal mat to a suction line. Pumps and other operating equipment for the process are located on a truck at ground level.

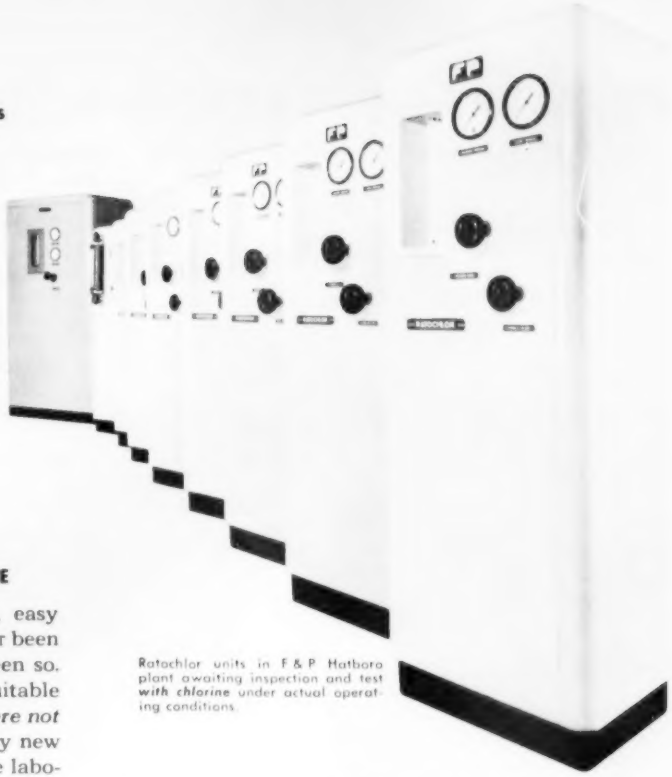
According to Morris Goodkind, chief bridge engineer for the highway department, this new process has made it possible to remove supporting forms in 2½ days where previously 14 days were required. This time saving permits the quick exchange of the special forms that are in use from one section to the next. These forms are mounted on a specially constructed, steel frame which is track mounted. Forms are lowered by jacks and the whole assembly wheeled to the next section.

Test slabs, which were poured at the site to determine the effect of the process through the crushing of cores drilled out of the slabs, indicated that sufficient strength was created within the 2½ days to permit stripping. Salamanders are also being used to control temperature during this initial period.

how much does it cost to stand pat?

It isn't often that a new development comes along that affects chlorine handling—in fact, not in the past 35 years has there been news as important as this to you and your community.

You may feel it costs you nothing to let new developments in chlorine handling go by the board. *But it costs your community plenty*—in money, in better chlorination and in better, *safer* handling methods.



Ratochlor units in F & P Hatboro plant awaiting inspection and test *with chlorine* under actual operating conditions.

AN ENTIRELY NEW WAY TO CHLORINATE

Not in 35 years has such a completely new, easy operating, dependable and economical chlorinator been made. There are many reasons why this has been so. One of the most important reasons is that suitable materials that could remain inert to corrosion *were not yet invented*. As a result of wartime needs, many new materials are available now that were not in the laboratory stages even ten years ago.

The most positive way to regulate and control chlorine is the diaphragm regulator principle. But until these corrosion resistant materials were invented, a regulator could not be made that lasted against corrosion. The regulator principle is successfully used in the new Fischer & Porter Ratochlor unit, along with such new products as Uscolite, manufactured by U.S. Rubber Co., Kel-F, Hastelloy, Teflon, and such timeless materials as silver and tantalum.

Old fashioned, out-of-date chlorine dispensing equipment uses vulnerable water seals, whereas in the Ratochlor unit, chlorine is always handled in fully enclosed, tightly sealed, corrosion resistant pipes and components. Chlorine losses from old fashioned design lead to increased corrosion, thus to excessive operating costs. Constant service calls add to costs, repeated maintenance charges mean that you still have an old fashioned unit with most original parts replaced. Such costs are cut to the bone with the new Ratochlor chlorinator.

The Fischer & Porter chlorinator was completely engineered to take advantage of all new developments, was then exhaustively tested in the field for five years. Now you can be sure of the finest in chlorination equipment. Even the outside cabinet is so new, of corrosion resistant *fibre-glass*, that it never needs painting, is resilient to withstand blows and vibrations. The Ratochlor unit is superior in every way. It is low in first cost, costs little to maintain.

You owe it to yourself and your community to *know* about this dependable, safe, less costly way of handling chlorine. Complete facts, fully illustrated, will be sent to you if you will request them right now.

EVERY RATOCHLOR IS BACKED WITH AN IRON-CLAD GUARANTEE

You can't go wrong in replacing old fashioned equipment NOW with the F&P Ratochlor chlorinator. Here's why. Fischer & Porter is a major company, leaders in flow control instrumentation. Hundreds of tons of live chlorine are handled daily by F&P Flowrator* meters in the chemical industry. The Ratochlor unit is so superior to any ever offered, so simple in design and control that it is almost entirely free of costly, repeat service calls. Equipment now in daily use in many communities shows that yearly maintenance costs are a fraction of older units.

Fischer & Porter stands four-square back of *every* Ratochlor unit. Before you agree to buy, F & P will install a Ratochlor chlorinator for a thirty day test period. During this time, you can subject this new unit to any kind of test you can make. *You must be fully satisfied.*

And the day you install your first Ratochlor unit, is the first day of a full year during which you must continue to be fully satisfied with it. Even at the end of one year, if you're not fully satisfied, the Ratochlor unit will be taken out and the full cost—every cent of it—will be refunded. You can't lose with the Ratochlor chlorinator.

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2261

METHODS OF TREATING INDUSTRIAL WASTES

The two papers presented here in somewhat condensed form appeared in "Santitalk", the excellent publication of the Division of Sanitary Engineering, Massachusetts Department of Health.

Coagulating Rouge with Calcium Chloride

JOSEPH A. McCARTHY,
Chief, Lawrence Experiment Station

THE wastes from the manufacture of optical glass, particularly those from polishing processes, contribute a factor to stream pollution quite out of proportion to their relatively small volume. The wastes are low in organic matter, practically all of which comes from the detergents and other wetting agents used in the process, and so they contribute very little BOD to the streams. They do contain large amounts of very finely divided iron from the rouge used in polishing and a considerable quantity of glass, many particles of which are microscopic in size. These materials, together with the detergents present, form a quasi-emulsion which is very turbid and high in color, which ranges from brick red to scarlet.

Because of their emulsion-like nature, the wastes cannot be settled; sedimentation periods up to two weeks effect no apparent difference in appearance. Biological treatment is obviously useless since the ratio of organic matter to total solids is extremely low and the particles present would coat any biological medium.

One of the wastes was very alkaline and acid treatment alone failed to break the emulsions. Alum proved useless in any amount. Lime gave a fair reduction in suspended solids, but although a considerable reduction in total color was obtained the original characteristic reddish color was still too apparent. Iron salts, especially ferrous sulphate, gave results somewhat similar to lime in optimum concentrations, but amounts of coagulants very slightly above or very slightly below the exact requirements gave supernatants worse in character than the original waste, so that the use of iron salts seemed hardly dependable without extremely close technical control. In any case iron treatment left considerable of the original reddish color.

Calcium chloride is an effective coagulant for alkaline wastes containing soap or other detergents. Trials with the rouge waste showed that calcium chloride effected a more satisfactory removal of suspended solids than any other coagulant and was equally satisfactory in the removal of iron; but, most important, the chloride was the only agent which removed completely all traces of the reddish tinge. The amount of calcium chloride was not critical and several trials showed that 250 parts per million, or about 2 pounds per thousand gallons, continued to give satisfactory treatment, although the concentration in the various waste samples differed quite considerably. The sludge settled rapidly and its volume was very small. The supernatant was clear and practically free from caustic alkalinity. When the untreated waste was diluted with 50 volumes of water from the receiving stream the red color could still be detected,

Modern Sludge Digestion Installed for Treating Levittown's Sewage

FOUR 55-ft. diameter digesters, with PFT floating covers, are serving the Levittown, Pa., sewage treatment plant. The view above shows the control room which is located between the four digesters and houses digester heating and control equipment. A separate area is provided for the gas safety equipment. In addition to the four digesters, other PFT equipment includes 4 cover position indicators with low level alarms; 4 supernatant selectors and gauge glass and sampler units; a heater and heat exchanger unit with an output capacity of 750,000 btu per hour, arranged for gas firing; a heater and heat exchanger unit with an output capacity of 500,000 btu per hour arranged for gas and oil firing; and various items of safety gas equipment. The Levittown sewage treatment plant was designed by Albright & Friel, Inc., consulting engineers of Philadelphia.

but in the undiluted supernatant from the coagulation the color was completely absent. Treatment reduced total solids from 1080 to 3, color from 900 to 35, and BOD from 40 to 28.

Experiments were carried on with another polishing waste which was much more concentrated. The iron content was 1000 ppm in one sample. The color was difficult to measure by normal standards but was probably at least 5000. The intensity of this color can best be pictured in this way: when the waste was diluted with 100 volumes of water from the receiving stream, which was far from colorless, the bright red color was still evident.

Calcium chloride again proved to be the best coagulant; from 600 to 700 ppm were necessary. Because the original waste was almost neutral it was found that the most effective and economical coagulation was obtained by adding 75 to 100 ppm of lime with about 600 ppm of calcium chloride. The reduction of iron effected by the mixed coagulants was in every case well over 99 percent and the reduction of color was such that a mixture of the supernatant liquor with only one volume of river water showed the barest trace of the original red color. The amount of BOD was insignificant in this waste. Treatment reduced color to 30 and total solids from 730 to 5.

The effluent from the calcium chloride treatment process was, in the case of the first plant, of better quality than the water used for industrial processing.

Trickling Filters Treat Flax Wastes

WARREN H. OLDAKER,
Associate Sanitary Biologist,
Lawrence Experiment Station

STUDIES were made on the black cooking liquor discharged from the pretreatment of flax fiber in preparation for the manufacture of flax specialty papers. At the plant studied, the total volume of cook liquors, wash and rinse waters discharged averaged 30,000 gallons/day. Black liquor alone averaged 13,000 gallons/day. The five-day BOD of the cook liquor discharged to the river ranged from 30,000 to 40,000 ppm which is roughly equivalent to the pollutional load contributed by a city of 22,000 persons. In terms of production capacity of the mill discharging the black liquor, the average pollutional load con-

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- All sealing surfaces protected from line fluids.
- Full threaded lubricant screw.
- Quarter turn opens or closes.
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tributed to the river consisted of 1500 to 1600 gallons per ton of product produced or, roughly, 450 pounds of five-day BOD per ton of product. The waste cook liquors from the second stage cooking contained about two percent caustic with roughly 12 percent solids. This black cook liquor was discharged to storage tanks before recycling to the first stage cooking boilers. Re-use of the black liquor meant a saving of the caustic. The black liquor discharged from the storage tanks to the first stage boilers was heated to roughly 300°F. with steam and reused in the cooking of the raw flax fibers bfeore discharge to the river. The black cook liquor sent to the stream for disposal was highly alkaline with 0.3 to 0.5 percent caustic and 13 to 14 percent solids.

Acid Treatment

Acid treatment of the waste provided only 28 percent BOD reduction with 80 grains H_2SO_4/gallon of waste. Greater concentrations of acid did not effect greater BOD reduction. Treatment of the waste with acid and alum effected a 44 percent BOD reduction, with 70 grains acid and 100 grains of alum/gallon of waste. Increasing acid or alum quantities did not cause a greater BOD reduction. When the waste was treated with acid and ferric chloride, 50 percent of the BOD was removed in the presence of 50 grains of acid and 100 grains of $FeCl_3$/gallon of waste. Increased quantities of acid and $FeCl_3$ did not increase the amount of BOD removed.

Chemical treatment to precipitate out solids and lower the BOD appeared to be impractical because very large amounts of sludge were formed at the optimum concentration of coagulants. Also, the waste must be diluted to at least a 5 percent concentration before chemical treatment, and relatively expensive amounts of chemicals were required.

Biological stabilization was investigated by use of twin, six-inch diameter rock trickling filters. The raw, untreated flax waste was diluted with raw river water to approximately a one percent waste. The BOD loading was roughly 500 lbs./acre foot/day. Before passing the untreated waste through the filter, it was necessary to develop on the filter stone a biologically active sludge which had become adapted to the one percent waste. Seeding was accomplished by applying settled sewage and waste mixtures to the twin filters for ten days prior to test application.

The raw waste added to the filters fell within a pH range of 7.9 to 9.8. The pH of the effluent ranged from 7.6 to 8.3. The filters became more efficient in respect to BOD removal of the waste as the test progressed. After 35 days of waste application, the filters were about 15 percent more efficient in respect to BOD reduction, which ranged from 57 to 72 percent. Effluent BOD ranged from about 120 to above 200, with applied BOD from 400 to 560 ppm.

• • •

"Jack" Ritter

(*Continued from page* 18)

sional committee that almost two-thirds (63.8%) of the country's federal-aid highway system is below the safe standards required by traffic demands. He estimated it would take nearly $35 billion to bring the system (s) up to desirable standards. This money would be required over, say, a 15-year period. The New York state legislature is considering, in several places, what is probably the largest road program ever considered in any state—a total of $3.5 billion. The total program includes an eventual increase in the

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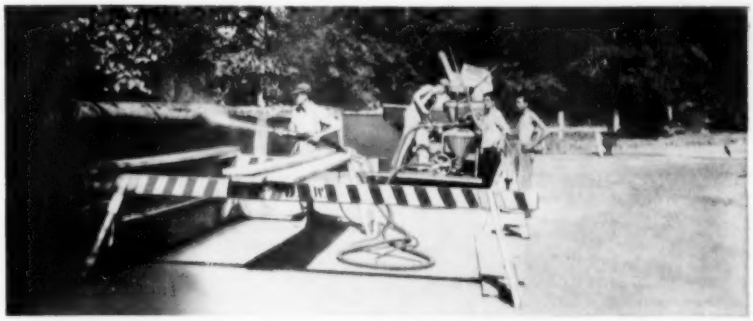
state gasoline tax, several bond issues for both "free" and toll roads, increased federal aid, and other things. Meanwhile, the Massachusetts legislature is considering a $150 million bond issue to continue the accelerated highway construction program in that state. About one-third of the new funds, if approved, will be spent in the area of metropolitan Boston. The Colorado legislature enacted a resolution which empowers the Highway Commission to issue 16 million dollars in bonds to finance construction of a toll tunnel beneath the Continental Divide. Also, toll road officials in Texas have expressed the belief that construction of a new 246-mile toll facility from San Antonio to Dallas will get under way soon.

Real Progress: Without too much fanfare, work on the planning, design, and construction of the Atlanta Freeway System has continued since its real beginnings in 1944. A joint enterprise involving the City of Atlanta, Fulton County, the State of Georgia, and the Bureau of Public Roads, the Freeway is a model of careful, far-sighted planning and smooth cooperation among the agencies concerned. About 15 miles of the Freeway has been completed, or is under construction, at an expenditure of some 30 million dollars. Completion of the project, as presently planned, will require another 25 million or so. Meanwhile, the Garden State Parkway in New Jersey is approaching completion, with 120 of the 165 miles scheduled to be in operation by July 1. When finished, the Parkway will span the state from north to south, from Bergen County to Atlantic City and Cape May.

Sufficiency Ratings: The use of the sufficiency rating system in graphically portraying the need for improved highways continues to increase. Washington now applies sufficiency ratings to all state roads, while a similar application is scheduled for this year in Oklahoma. Sufficiency ratings can be a powerful weapon in highway improvement, particularly in selling the program to the public. We're surprised that comparatively few local governmental units have put it into use. From where we sit (the position of "sideline quarterback", we guess), it looks like some people are missing a good bet. If you're interested, why not drop a line to Roy Jorgensen, National Highway Users Conference, Washington, D. C., and ask him for the latest dope?

City-Owned Portable Rig Guns Concrete at Low Cost



● **THE CITY OF SYRACUSE, N. Y., moves its Bondactor quickly and easily from one concrete restoration project to another on the portable rig shown here on the job.**

● **BEFORE RESTORATION with Bondactor equipment, a wire mesh support for the gunned concrete was set in this badly deteriorated retaining wall.**

● **AFTER GUNNING with the Bondactor rig that was moved easily along as the job progressed, the wall is completely restored.**

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PUBLIC WORKS DIGESTS

THE SEWERAGE AND REFUSE DIGEST

Refuse Disposal In Detroit, Mich.

Detroit, 2,000,000 population, uses 586 special trucks and collection crews making 1,350,000 stops every two weeks to collect wastes. About 500,000 truckloads of garbage and refuse are disposed of annually in four incinerators and seven sanitary landfills. In planning the present system, several thousand truckloads of rubbish were examined and it found that 82% was burnable and bulky; therefore enclosed, compaction-type trucks were desirable. Several designs were tried. Some could not be used in the narrow alleys; others presented problems in maneuverability, or had too complicated mechanisms. Tests conducted jointly by the Sanitation and Motor Divisions resulted in the selection of a 16-yd. packer. The city was divided in 7 districts, and these into sections, and each of these again into 10 units, each representing the collecting capacity of an average work day. Household rubbish is collected once every two weeks; that from business and commercial establishments once or twice a week, and every night in the loop district. The collecting trucks dump into a pit (to eliminate long hauls) refuse destined for the dump, which is reloaded into large trailers for the trip to the dump. Garbage is collected weekly from householders, semi-weekly from minor business centers and daily in the Loop area.

"Organization: Key to Good Sanitation." *American City*, March.

Research in Waste Disposal

Progress in sewage treatment in the last two decades has been almost exclusively in refinements of established processes, principally in increased mechanism and control. Significant new progress is predicated on a return to the fountainheads of pure chemistry, biology and physics. The author presents five broad avenues of advance. 1—Through re-evaluation of indices of pollution and contamination. 2—Added emphasis on methods of evaluating pollution load capacities of streams and concomitantly on improvement in the art of plant design to attain stipulated amounts of treatment. 3—More effective and economical waste treatment and disposal methods for small and isolated communities, especially under adverse conditions of climate, soil and topography. 4—Search for feasible modifications of industrial processes to reduce amounts of objectionable waste, so as to ease problems of trade waste treatment. 5—Standardization in the technical literature as to (a) symbols and nomenclature; (b) measuring units, such as loading parameters; and (c) forms of graphical representation, as well as (d) methods of statistical analysis and presentation of experimental results.

"Productive Research in Waste Treatment and Disposal: A Program." By Harold Allen Thomas, Jr., Assoc. Prof. of San. Eng., Harvard Univ. *Sewage and Industrial Wastes*, February.

Disposal by Crop Irrigation

In the United States little thought has been given to crop irrigation until recently. Irrigation appears to be especially well suited for industries, such as canning, which are seasonal in operation. Crop yields have been increased markedly through well-managed irrigation but over-irrigation may result in killing a crop, deleterious effects on the soil, and possibly pollution of shallow wells. For studying the amount of waste water that can be applied and its effect on crops, soil, and ground water conditions, investigations were begun in August, 1950, on disposal by irrigation of wastes from the Oscar Mayer & Co. packing plant. From these it was

Corn Loader Cuts Sludge Bed Cleaning Time

J. H. WIGGLESWORTH

LOCAL topography at the sewage treatment plant of Russell, Kansas, (pop. 7,000) resulted in sludge drying beds that were quite deep. Using wheelbarrows and a long wooden ramp, it was a three-day job to clean the sludge from the beds. Even the laborers from the city jail, who were often used on this job, didn't like it.

A piece of farm equipment, a corn loader, was bought and used for this purpose. The resulting ease of cleaning cut the time from three days to a half-day. To provide for lateral movement from one bed to the next, a retractable gear of two small pneumatic-tired wheels was added. A screw-type bumper jack was used to raise or lower these wheels. With the gear in the raised position, one of these wheels may be seen in the photograph directly over the right-hand wheel of the elevator. Total cost of the equipment was less than $500.

learned that, in the area under study, 40 in. or more of effluent can be applied to a crop of Reed canary grass during the growing season; probably less to a crop less tolerant to wet soil conditions. This removes virtually all of the nitrogen, phosphorus and potassium from the percolating water. A high concentration of sodium in the effluent increases the losses of calcium and magnesium to the percolate. If these losses are too great and sodium accumulates in the soil, the physical condition of the soil will be harmed. The plant nutrients in the effluent increased the crop yield by about 1 ton per acre on a mineral silt loam, and about 2 tons on peat, which is high in organic matter. Drainage water from the irrigated soil did not increase the coliform index of the nearby creek, but did increase its chloride and sodium content.

"Sewage Effluent Disposal Through Crop Irrigation." By C. D. Henry, R. E. Moldenhauer, L. E. Engelbert, and E. Truog, Dept. of Soils, Univ. of Wisconsin.

At Seabrook Farms, Bridgeton, N. J., 3700 acres are being irrigated. Originally, stream water was used, but since 1950 increasing amounts of vegetable processing water has been used. This experience has shown that this method can be used for irrigating crops, replenishes the ground water, and furnished a happy solution of the company's waste disposal problem.

Discussion of the above by R. A. Webster, Supt. Seabrook Farms Co. *Sewage and Industrial Wastes*, February.

Treating Metal Finishing Wastes

The General Electric Co. at its Erie, Pa., plant has operated for 2½ years a waste treatment plant that cost $705,000 to install and costs $100,000 annually to operate. It treats metal-finishing wastes carrying acids, cyanides, chromium, and other metal ions so as to discharge a satisfactory effluent into Lake Erie. The sludges are dewatered by vacuum filtration, a mixture of clarifier and neutralized acid sludge is filtered readily on a continuous basis without the use of a filter aid. This costs more than lagooning, but the greater convenience in handling the filtered sludge is considered well worth the greater cost.

"Treatment of Complex Metal-Finishing Wastes." By K. S. Watson, Coordinator of Waste Treatment, G. E. Co. *Sewage and Industrial Wastes*, February.

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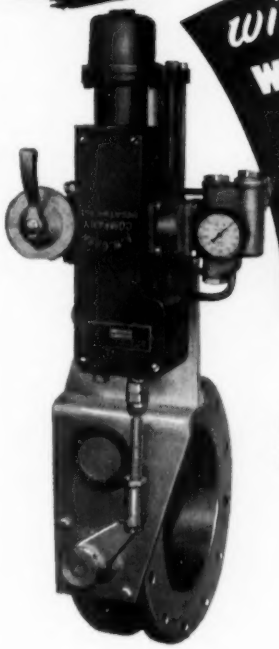

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Designing Ground Absorption Systems

Five years of experimental research, supplementing 20 yr. of experience in Alabama, has resulted in development of a rational method of designing ground absorption systems for treating septic tank and other effluents. The basic feature is the absorption trench, the construction of which would be standardized. The problem is to determine how many lineal feet of the standard trench must be provided in a given case, and the area of absorption field required. The data used in the calculation are the absorption rate of the soil of the absorption field; the estimated amount of the effluent to be treated and the rate at which it will reach the field, and the allowance to be made for the difference between the liquid to be applied and clear water. Also, the records or estimate of the periodic rise and fall of the ground water level and its effect on absorption should be considered. The absorption rate is to be determined by a slight modification of the standard method of determining the time required for absorbing water from a standard-size hole in the proposed field. The proposed standard absorption trench is made as follows: The trench is 18 in. wide and 30 to 36 in. deep, the bottom perfectly level from end to end. In this is placed 2-in. stone to a depth of 12 in., the sides and top of the stone being covered with roofing paper or other material to prevent soil from entering the stone. No pipe is placed in the trench. The liquid is admitted to a trench 8 to 12 in. above the bottom and the outlet pipe is 6 in. above the bottom; thus the sewage stands 6 in. deep in all trenches of a system. There may be several connected systems, each with its own level.

"Rational Design for Ground Absorption." By Owen G. Quenelle, San. Engr., Dept. of Public Health, Ala. *PUBLIC WORKS*, April.

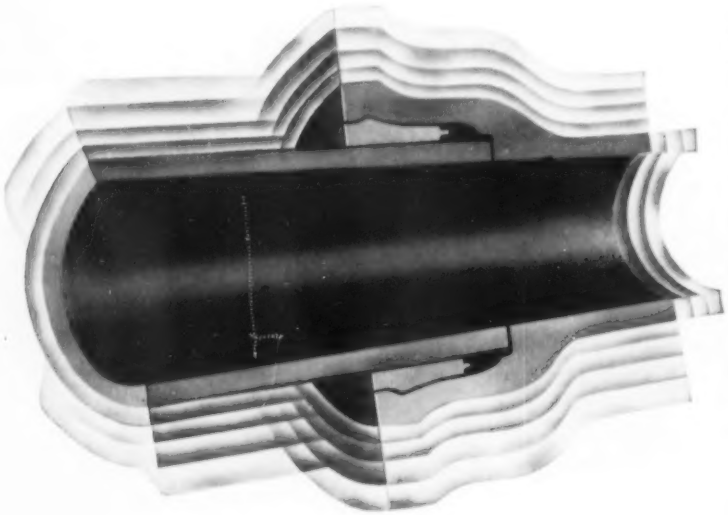
Importance Of Infiltration

Infiltration into a sewer system may cause overloading of the sewers and backing up into cellars, and necessitate otherwise unnecessary increase of sewer capacities and of treatment plants. Racine, Wis., finding the flow of sewage to its treatment plant more than doubled by infiltration, made a thorough study of causes and remedies. A study of the records at the treatment plant for several years past showed a decided decrease of flow during the dry fall months as compared to the rest of the year. The greatest flow attributed to infiltration is at the time when the dry weather flow is minimum, indicating that some sewers may be loaded to capacity by infiltration alone. It was estimated that the rate of infiltration when maximum was 5,725 gpd per mile per inch diameter of the sewers. Much of this is believed to be into sewers and manholes built 70 years or so ago, which probably should be rebuilt. During a year of average flow, 40% of the volume reaching the treatment plant was estimated to be due to infiltration. As the cost of operating the plant and intercepting system was $82,000, the infiltration cost $33,000 a year.

"Are You Treating Infiltration?" By Thomas T. Hays, Supt. *Wastes Engineering*, March.

Dual Disposal At Richmond, Ind.

The activated sludge treatment plant constructed by Richmond, Ind. in 1935 became badly overloaded by 1948. Plans were made then to enlarge the plant and to include garbage treatment facilities.



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The engineer, who was consulted recommended that sufficient digester capacity be added to permit digestion of garbage slurry with the primary and waste activated sludge, and its capacity was made 10 cu. ft. per capita on the basis of a 50% increase in population. The garbage is ground at the treatment plant and the slurry pumped to the digesters, thus avoiding loss of gas-producing volatile solids in passage through primary units. The gas is used to operate two blower units and a pump unit, the jacket water from the engines being used in the sludge heaters. During 1952 the gas engine units furnished all of the air for the aeration units (except for 6 hr.) and all of the return sludge pumping (except for 8 hr.) and gas was used to heat the buildings. The estimated value of the gas used was $1,500 for the colder months and $1,000 for the months when no building heat or extra heat for the digesters was required. A 32-ft. diameter gas sphere with a working pressure of 55 lb. per sq. in. was installed to insure more uniform operation of all gas-burning equipment. At no time has there been the slightest indication of foaming in the digesters. The total cost of the plant expansion was $870,000, of which approximately $101,750 could be attributed to the garbage equipment—about $1.69 per capita of the design population of 60,000. Use of the gas in gas engines, giving credit for the power so obtained, shows an operating profit of about $0.70 per ton of garbage.

"Dual Disposal of Garbage and Sewage at Richmond, Indiana." By W. E. Ross, Supt. *Sewage and Industrial Wastes*, February.

Treating Ground Garbage With Hospital Sewage

Within the past year the State Hospital at Elgin, Ill., has installed garbage grinders, and by last September was grinding at least 75% of its garbage and discharging it into the institution's sewers. The combined flow is treated by an activated sludge plant, which reduces the BOD by 96.6%. Adding garbage did not increase the amount of sewage, but the amount of raw sludge pumped was increased from 5,830 gal. to 9,250 gal. by adding 75% of the garbage. The BOD of the raw sewage increased from an average of 269 ppm to 360 ppm. The principal disadvantage is the great difference in biologic load between night and day flow.

"Garbage Grinders and Sewage Treatment at a State Hospital." *PUBLIC WORKS*, April.

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Flocculation Of Crude Sewage

Bury, England, finding its secondary treatment units overloaded because of increasing strength of the effluent from the settling tanks, has found a method of avoiding the cost of additional units, either primary or secondary, by decreasing the strength of the effluent from the primary tanks. This is accomplished by flocculating the crude sewage combined with settled sludge from the sedimentation tank. The mixture is flocculated by aeration for 3 hr. and settled for 1½ hr. Based on 4 hr. OA tests, a plain sedimentation tank gave a 21.7% reduction, and the flocculation procedure gave 42.3%, averages for July-December, 1953.

Crude Sewage Flocculation Has Solved Bury's Strength and Quantity Problems." *Municipal Engineering (England)*, *March* 5.

Treating Citrus Wastes

The methods previously used for disposing of citrus wastes are not adequate for the increasing quantities of such waste being produced. Laboratory studies have shown that a conventional activated sludge process can stabilize 99% of the 5-day BOD in a 5-hr. aeration period if the nitrogen deficit has been overcome by added chemical nitrogen. It is possible to develop an activated sludge from nitrogen-fixing bacteria which will remove 99% of the 5-day BOD in 6 hr. of aeration without the addition of chemical nitrogen. The "super-activated" sludge process is not as applicable as the conventional activated sludge process in treating this waste.

"Citrus Waste Treatment Studies." By Ross E. McKinney, Leon Poliakoff and Russell G. Weichlein. *Water & Sewage Works*, March.

Flotation and Sedimentation of Wastes

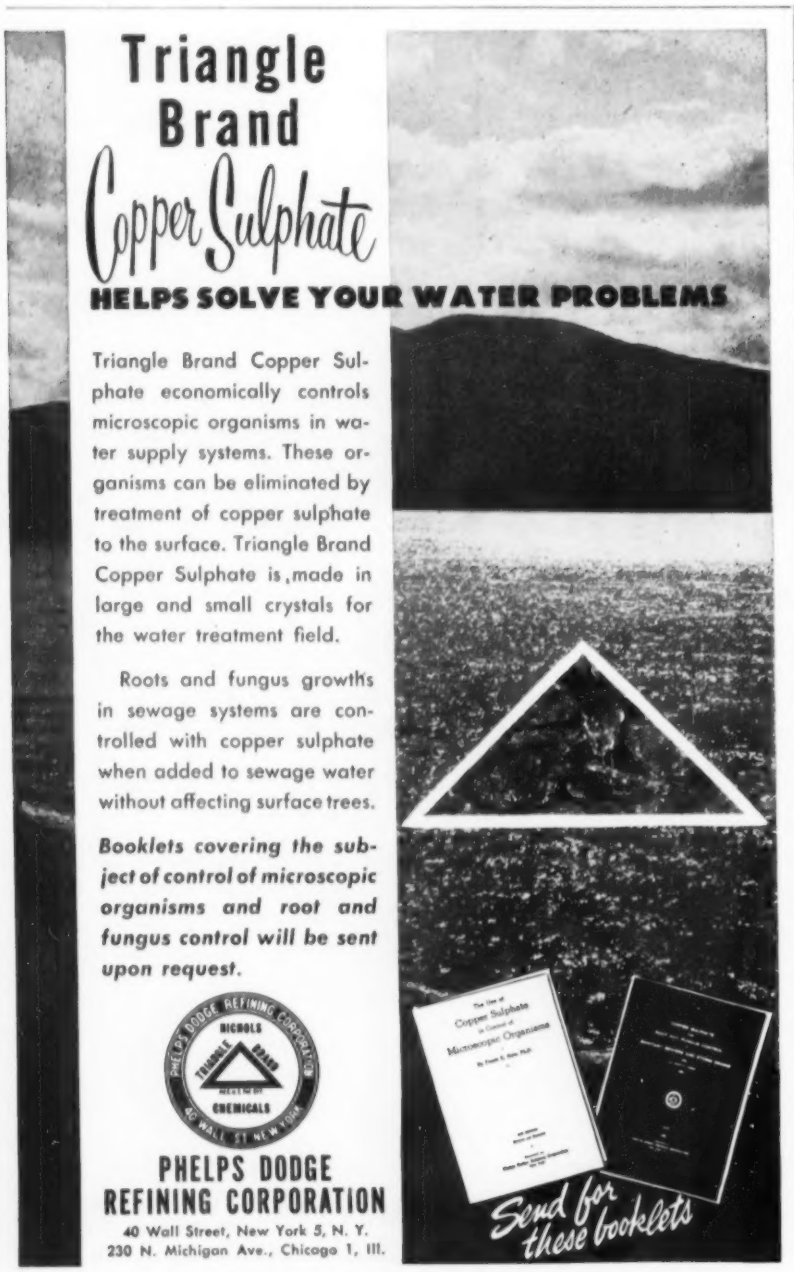
Suspended matters that settle slowly in sedimentation tanks can frequently be collected much more rapidly by flotation, and into a denser sludge. Flotation causes particles or droplets of foreign matter to float by the attachment to them of minute bubbles of air or gas applied under pressure. Since floated matter rises much more rapidly than it would settle by gravity, smaller tanks are necessary for flotation, hence capital costs will be less. However, the cost for power may more than offset this saving; moreover, the effluent will not be so highly polished. Where completeness of chemical reaction, density of precipitates and absorption of material being coagulated is aided by prolonged contact, a flotation unit should not be used; a solids-contact unit is indicated for such treatment problems.

"Flotation and Sedimentation in Treating Wastes." By A. A. Kalinske, and R. R. Evans, Infilco Inc. *Water & Sewage Works*, March.

A Newly Discovered Bacillus in Digesting Sludge

The authors report the isolation, from actively digesting sludge at Baltimore's Back River treatment works, of ar organism not known to have been previously isolated. It is a highly motile facultative anaerobic bacillus; of special significance because it resulted in the rapid production of gas when inoculated into raw sewage sludge; and the motility of the cell contents was of great cytological interest.

"A Motile Facultative Anaerobe Isolated from Digested Sludge." By T. C. Buck, Jr., C. E. Keefer, and Hester Hatch, Baltimore Health Dept. and Bureau of Sewers. *Sewage and Industrial Wastes*, February.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Biofiltration Plant At Beaumont, Texas

Beaumont has under construction a 30 mgd treatment plant which is believed to be the only one, except New York City, where two lines of sludge are mixed in calculated proportions to accelerate thickening. After passing through four primary clarifiers the sewage passes to two primary and two secondary filters, and from these to four final clarifiers. Sludge from both sets of clarifiers goes to two thickeners, and from these to two digesters, the primary digester to be heated, the secondary to be unheated. Sludge is expected to enter the thickeners with 2½% solids, that from the primary and final clarifiers to be mixed, and thickened in Dorr clarifiers to a density of 7½% solids or more, limited only by the ability to pump the resulting sludge.

Recirculation in the filter system is planned to maintain a flow of 60 mgd between primary and final clarifiers. (The design rate of normal flow of raw sewage is 30 mgd); 30 mgd of effluent from primary filters being returned to the primary clarifiers, and 30 mgd from the final clarifier effluent to the secondary filter. If and when the sewage flow exceeds 30 mgd, the amounts of returned effluents will be decreased to maintain the combined flow at 60 mgd. Each filter will contain 4410 cu. yd. of rock, placed 4 ft. deep. The estimated load is 34,000 lb. of BOD per day.

"Biofiltration Sewage Treatment in Beaumont." By Guy Browning Arthur. *PUBLIC WORKS*, April.

Size of Floc In Aeration Tanks

In a previous article (see Sewerage Digest in the March issue "Brush Aeration of Sewage") the author described experiments which showed that oxygen absorption was greater in a small tank than in a large one when mechanical aeration is employed. Experiments also indicate that the size of floc is an important factor—the rate of biochemical oxidation increases as the size of floc decreases. This does not reduce the amount of final sedimentation, for during the passage from the aeration tank to the secondary sedimentation tank the floc coagulates rapidly to form larger sizes. The author warns that these experiments were made with mechanical aeration only; where aeration is by compressed air, the turbulence in the tank may be less.

"Purification with Intense Aeration." By A. Pasveer, Nat'l Health Research Council, Netherlands. *Sewage and Industrial Wastes*, February.

Other Articles

"The Detergent Situation" in England. By John Finch. Mgr. Sewage Disp., Rotherham, England. Water & Sewage Works, March.

"Enzymes Give Good Results in Sewage Treatment Plant" (at Niles, Mich.). PUBLIC WORKS, April.

"Trickling Filter Design, A New Concept in." By Bruce Gerber. Sewage and Industrial Wastes, February.

Heating sludge digesters at Dayton, O. "Controlled Heating Solves Sludge Handling Problems." By R. H. Calihan, Supt. Wastes Engineering, March.

"Chromic Acid Recovery by Ion Exchange." By R. J. Brink, Gen'l Motors Corp. Sewage and Industrial Wastes, February.

"Toxic Substances in Water, Determining Risks." By Edward J. Cleary, Chf. Eng'r, Ohio River Valley Water Sanitation Com'n. Sewage and Industrial Wastes, February.

"The Monomolecular Formula, An Improved Form." By James H. Wiegand, Southwest Research Institute. Sewage and Industrial Wastes, February.

"Insect and Rodent Control in Local Disaster Planning." By Louis B. Read. PUBLIC WORKS, April.

All sluice gates installed in the **United States Steel Corporation's** huge, new Fairless Works, Fairless Hills, Pa., were designed and manufactured by PEKRUL. Shown here are several gates among approximately 200 PEKRUL gates installed in pump stations and sedimentation basins.

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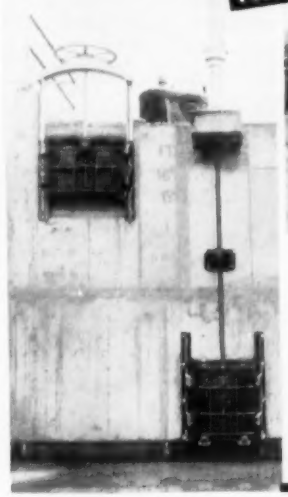

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A Recommended Standard Practice for Competitive Bidding and Letting

BELIEVING it to be in the interests of the public to conduct bidding and letting of municipal work as uniformly as possible, a Joint Cooperative Committee, representing the Minnesota Society of Professional Engineers and the Associated General Contractors of Minnesota, has developed recommended standard practices representing the composite experience of consulting engineers and general contractors engaged in municipal work. They are part of the continuing work of the committee devoted to improvement of standards of design and construction in the municipal public works field.

Recommended Procedure

1. Deposit for Plans and Specifications: It is recognized that the Engineer should require a reasonable deposit for plans and specifications, which deposit shall be refunded to bidding Contractors upon return of same, in good condition, within ten days from date of bid opening. The deposit, less cost of production of plans and specifications, shall be refunded to non-bidders if plans are returned in good condition prior to closing time set for receipt of bids. The reasonableness of the deposit should be governed by the cost of production. The Engineer should have the right to limit the number of sets of plans which he will furnish.

It is recommended in the case of manufacturers, suppliers and subcontractors who are not considered "bidding contractors", that separate sheets may be furnished at cost.

2. Time for Estimating: Ample time should be allowed the General Contractor for the take-off of quantities, preparation of his estimate and the closing of his bid. This time should be a minimum of two weeks for smaller projects, running to thirty days for major projects.

Addenda should be in writing and in the hands of bidding General Contractors at least three days before closing date.

3. Time for Receiving Bids: A definite time and place for receiving bids shall be stipulated at the time bids are invited. This time shall not be earlier than 2:00 PM of any day. Bids shall not be asked for on Saturdays, legal holidays or the day following a legal holiday, and preferably not on Mondays.

All bids must be received prior to closing time set for receipt of bids to be considered. Revisions to bids must be received prior to closing time set for receipt of bids to be considered, and such revisions may be delivered in person, mailed or wired. Bids should be opened immediately after the closing time set for receipt of bids.

The practice of tendering bids through representatives of the Engineer or Owner will be considered unethical procedure.

Whenever possible, the three lowest bidders shall be given the opportunity of appearing before the awarding authority prior to the award of the Contract.

4. Certified Checks or Bid Bonds: Whenever possible, bid bonds should be permitted in lieu of certified checks. If certified checks are required, they shall be returned to bidders, within five days after date of receipt of bids, except the checks of the three lowest bidders, which checks shall be returned within thirty days after bidding date.

5. Standard Proposal Forms: a. The Engineer will prepare a standard form of proposal or bid blank and will furnish to bidding Contractors, one more copy than required to be returned to the Owner. b. Each bid item will be fully described and identified in the specifications. c. Bids which are not submitted on this standard form of proposal should be rejected.

Alternate Bids

6. Alternate Proposals: Alternate proposals should be requested, only when they are believed of especial and major importance to the Owner, either as a means of insuring a bid within a limited appropriation or providing an opportunity to make an important determination in the selection of a material or process. Unsolicited alternates will not be considered.

7. Opening of Bids: a. At the time of opening bids and before publicly reading them, the Owner's representative shall examine all required attached documents for their correctness and adequacy. If the documents are not as required, the bid will not be made public but will be returned to the bidder with the reason stated for such rejection. b. Bids to be considered, must be typed or printed in pen and ink. c. At opening of bids, only totals shall be read and unit prices read only if requested. d. When unit prices disagree as to words and numbers, the words shall govern.

8. Form of Contract: The Form of Agreement to be used shall be the standard form as may be developed.

9. Subcontracts: a. A General Contractor has no responsibility to accept any unsolocited sub-bid. b. It is unethical, unjust and detrimental to the construction industry where a Contractor, prior to the award of a general contract, discloses to Engineers, Owner, or others, the amounts of sub-bids or quotations obtained in confidence for the purpose of preparing his bid. c. Every sub-bid or material quotation should be based on identified sections or headings in the specifications and related drawings. d. The form of subcontract to be used shall be the standard form as may be developed. e. The General Contractor shall, if requested, submit a list of sub-contractors he proposes to use on the work, prior to beginning of work.

Compacting Places That Are Difficult to Reach

WHEN Tyrrell & Davis Co., Pasadena contractors, were faced with a job of compacting the corners of steep slopes around large-size fuel oil tanks, they came up with a new idea fathered by Robert McKession, consultant. He designed a 2700-lb. rubber-tired wheel which was mounted on the end of a Gradall boom. With this, the operator could reach out to the hard-to-get-to places, speed up the work and do a good job.

● **THIS shows how the wheel was attached to the Gradall boom.**

10. Time of Making Awards: Awards should be made within 30 days of letting date unless otherwise specified, providing, however, that extension of time may be agreed upon with the low bidder.

11. Withdrawal of Bids: Bids may be withdrawn at any time prior to opening time either by hand or by written or telegraphic notice.

12. Completion Time: It is recommended that bids be subbitted on the basis of a completion time stipulated in the specifications.

• • •

Sanitary Engineering Scholarships at Harvard

The Harvard School of Public Health will give postgraduate scholarships in amounts ranging up to $5,000 to qualified candidates desiring to study at the school during the academic year 1954-55. The scholarships include public health engineers seeking additional training and research experience leading to either a Master of Science in Hygiene or a Doctor of Science. More information is available from D. S. Davies, Harvard School of Public Health, 55 Shattuck St., Boston 16, Mass.

Sanitary-Civil Engineer Available

Engineer desires position with city engineering staff or consulting engineer. BSCE Milligan College; 2 years graduate study Yale; 14 years army service. Previous experience principally public health field, wishes primarily design and construction and work. Write KJ-5, Public Works Magazine, 310 East 45th St., New York 17, N. Y.

Wanted: Mission Bay Park Director

To serve as Director of its multi-million dollar Mission Bay Park, the City of San Diego is in need of a man with an outstanding record of achievement as a successful planner-promoter-director of large scale complete communities, international expositions, or integrated recreation developments. He must have tactful persuasiveness, ability to meet and influence individuals and groups engaged in large scale hotel, transportation, tourist attraction, and similar activities. He must be a college graduate; a knowledge of civil engineering and an appreciation of city planning problems and methods of solution are desired. Age to 52 years. Salary from $749 to $909 monthly. Apply to the Personnel Director, San Diego City Civil Service, Room 453, Civic Center, San Diego 1, Calif.

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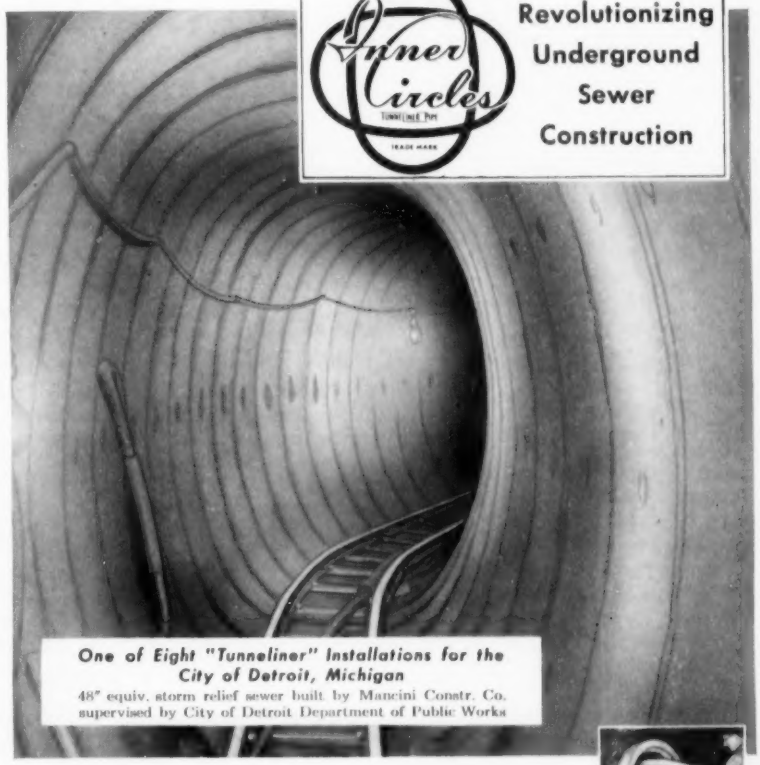


One of Eight "Tunneliner" Installations for the City of Detroit, Michigan

48" equiv. storm relief sewer built by Mancini Constr. Co. supervised by City of Detroit Department of Public Works

"*Tunneliner*" methods using Inner Circles precast concrete pipe, developed by Lamar, offer distinct advantages over other types of tunneling. Oval-shaped sections of full ring reinforced pipe of identical size are passed through themselves as excavation progresses to form a continuous conduit of pretested strength. This revolutionary new method of installing concrete pipe underground is aimed at solving all the difficulties encountered in tunneling.

Worker guides section of oval-shaped pipe carried through tunnel by Lamar *Tunnelugger*.

NO EXCAVATION AT SURFACE—NO TRAFFIC BLOCKED OFF —SEWER COSTS OFTEN ARE MATERIALLY REDUCED

Unskilled workers quickly learn "*Tunneliner*" methods in the first few hours on the job. Less equipment is needed, yet sewers are completed in faster time. Advantages have been thoroughly proved in tunneling through wet sand, river muck, loose rock and various clay conditions.

Section is easily tilted upright on *Tunnelugger* arm.

Sizes of "*Tunneliner*" pipe now available—33" through 72"
All necessary special equipment is furnished at a nominal rental charge.

Section is turned, then seated by *Tunnelugger*.

For complete information—write, wire or telephone

LAMAR PIPE & TILE DIVISION

AMERICAN-MARIETTA COMPANY

Grand Rapids 9, Michigan

Inner Circles "Tunneliner" Pipe is available anywhere in the nat on through licensees or through divisions and subsidiaries of the American-Marietta Company—The Lamar Pipe and Tile Company, Concrete Products Company of America and Universal Concrete Pipe Company. 32 plants coast-to-coast.

Now's the time to mail this month's Reader's Service card.

PUBLIC WORKS DIGESTS

THE WATER WORKS DIGEST

Hydrant Installation And Maintenance in Wisconsin

In the cities of Wisconsin there are 22.1 hydrants per 1,000 population, compared with 17.3 for the nation. There are 7.0 hydrants per mile of street. The majority of towns place their hydrants approximately 24 in. from the curb and 18 in. above it. Milwaukee places some hydrants at a 45° angle with the curb, in the direction of traffic flow. No city uses color codes to indicate rated capacity, but several use color to designate size of main or source of supply. In Milwaukee all new hydrants are drained to a crushed stone sump or to the ditch. Several cities place a cement block over the drain hole to prevent clogging. One city places hydrants in manholes. Most cities inspect hydrants quarterly in summer; in winter 35% of the cities inspect weekly, the other 65% monthly or less frequently. In winter, 35 pump out the hydrants, 9 use antifreeze, 7 plug the drain, 2 place manure around the hydrant. Most of the repairs needed are to the drain valve, hydrant valve, or stuffing box. Milwaukee prefers the O ring to a stuffing box. Two-thirds of the cities prefer a hydrant with a breaking ring or shear point.

"Hydrant Installation and Maintenance in Wisconsin." By William Hammann, Jr., Engr. Milwaukee Water Dept. *Journal, American Water Works Ass'n*, March.

Metering Public Use of Water

An accurate calculation of the percentage of water accounted for is impossible unless all services are metered, including municipal buildings, schools, etc. Of 33 water departments reporting, 22 meter city buildings, 10 of these saying that the city paid for such water. Several estimate the amounts used on large fires by noting the number of hose lines used and the time the water is turned on. Of the 33, 23 account for 75% or more, 20 for 80%, 14 for 85%.

"Accounted-for Water — How Much Is It?" *Water Works Engineering*, March.

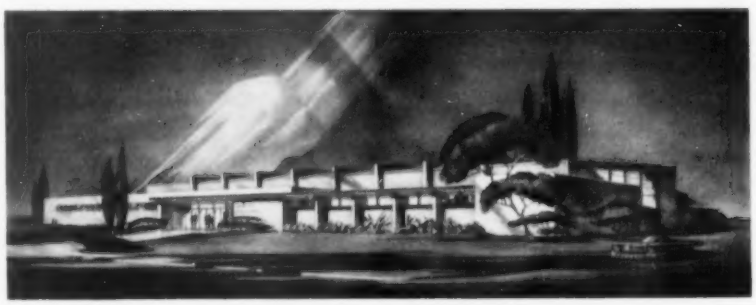
Water Pollution By Oilfield Brines

Oilfields produce connate brine with the oil, the amount increasing with the age of the well. A typical brine contains 11,000 ppm of sodium ion and 17,000 ppm of chloride. If the quantity of brine is not too great, it may be permissible to discharge it into sewers that have an ocean outlet. Where this is not practicable, some firms pump the waste water back into oil sands below fresh water levels, utilizing abandoned oil wells. But many operators find this financially impracticable and discharge the brine on or near the surface, which practice in some cases pollutes the water in wells through underground seepage. One such case was investigated in 1953 by the Los Angeles Regional Water Pollution Control Board, which resulted in recommendations aimed to eliminate such pollution. These recommendations are published in this article.

"Underground Water Pollution by Oilfield Brines." By Carl B. Johnston, Engineer of the Board. *PUBLIC WORKS*, April.

Taste and Odor Control at Painesville

Painesville, Ohio, takes its water supply from Lake Erie. During the spring and fall turnover of the lake,



An Unusual Municipal Swimming Pool

AN indoor swimming pool, costing $338,000 will be built very soon for the city of Lynwood, Calif. This pool has many unusual features and represents the latest in design. Construction of the pool will be by MacIsaac and Menke, general contractors of Los Angeles. Brooks and Miller, civil engineers of Duarte, were the designers, which is shown above.

The pool will be 50 ft. wide and 164 ft. long, of concrete. Center depth will be 12 ft., with shallow water at the ends. Covering the pool will be a brick and glass building, covering 25,800 sq. ft. and serving a maximum of 810 persons. Because the designers considered them to have many advantages, diatomaceous earth filters will be used for clarifying the pool water. To assure maximum circulation and admixture of the filtered clean water entering the pool, fan-shaped nozzles or inlets will be placed near the bottom, but on the exterior face of the pool walls.

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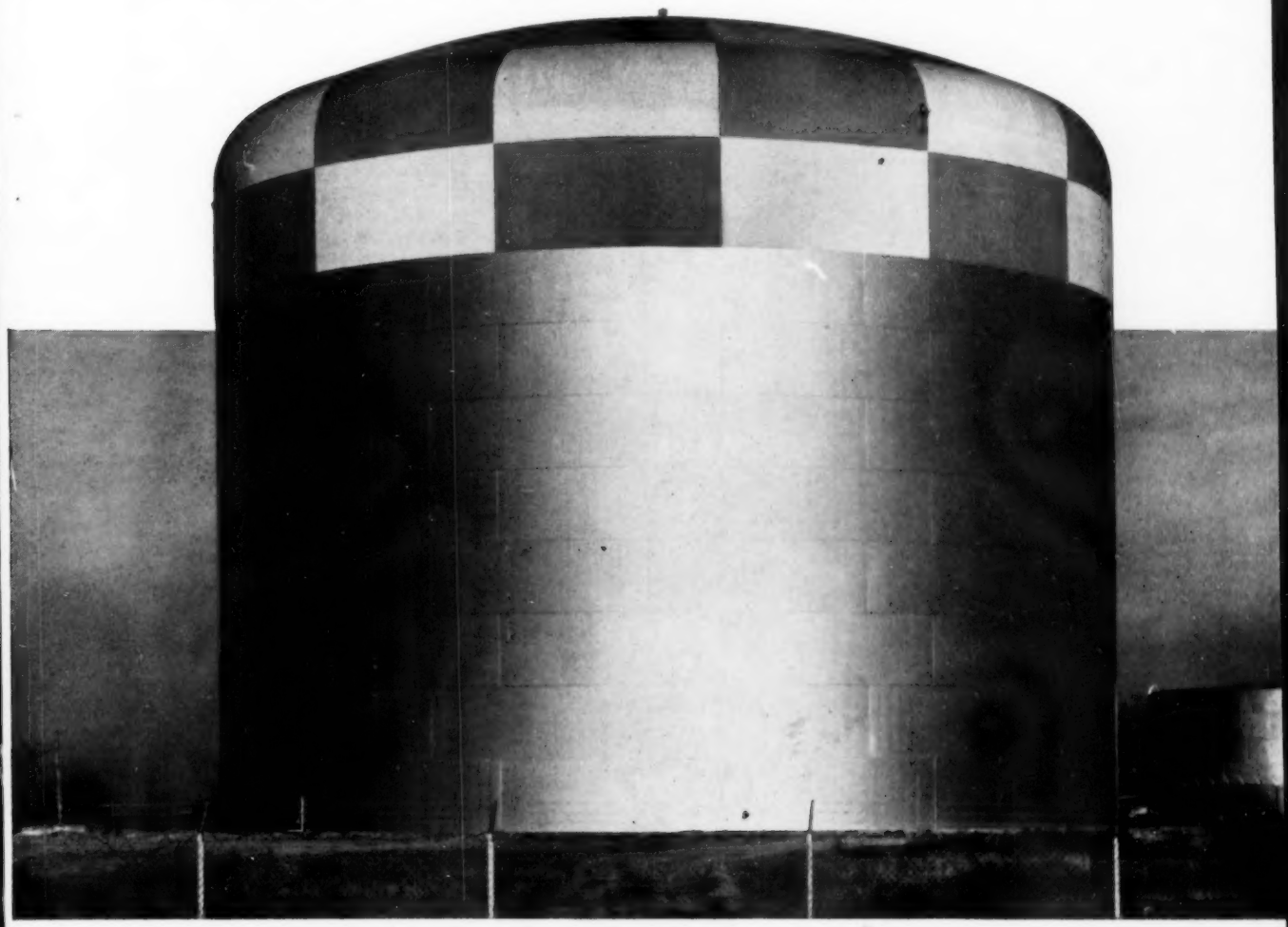

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This huge water storage unit evidences typical Pittsburgh-Des Moines fine workmanship in shop fabrication and field erection. Measuring 116 feet in diameter, with a water depth of 95 feet and total capacity of 7,268,000 gallons, the South Pittsburgh Water Company giant is the largest standpipe-type storage tank built in America to date. • Let us quote on your water storage needs.

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DALLAS (1).....1247 Praetorian Building
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algae produce more or less odor and taste. In 1952, they reduced the filter runs from an average of 24 hr. to approximately 4 hr. Activated carbon applied at 10 ppm, and pre-chlorine and post-chlorine treatment, failed to control the taste and odor, and a representative of Industrial Chemical Sales investigated the problem. The conclusions reached were that chlorination, while it changed the odor character, did not reduce its intensity. Application of activated carbon through the mixing basin reduced the odor concentration to the point where subsequent chlorination produced palatable water. It is not desirable to apply carbon and chlorine at the same point, since carbon absorbs chlorine. The savings in chlorine by previous application of activated carbon is comparable to a feed in the range of 2 ppm.

"Experiences With Taste and Odor at Painesville, Ohio." By Forrest E. Allison, Supt. of Filtration. *Taste and Odor Control Journal*, February.

Freezing Large Pipe With Dry Ice

Freezing service pipe with dry ice to permit making repairs has been a more or less common practice for a number of years. The author experimented to learn how large a pipe it is practicable to freeze by this means. He experimented with 2-in., 4-in. and 6-in. pipe, with success in each case. Finally he froze a 12-in. pipe. By these tests he learned that it is desirable to crush the dry ice and pour in a few gallons of gasoline or denatured alcohol —preferably the latter, as these hastened the freezing materially. In freezing the 12-in. pipe, almost seven hours were required, using about 350 lb. of crushed dry ice and gasoline. The 4-in. main was frozen in about 1¼ hr., and the 6-in. in about 2 hr., using 150 to 200 lb. of dry ice. In thawing a frozen main it is not advisable to use warm water or even cold, as this might cause cracking of the pipe.

"Dry Ice Successfully Used Freezes Twelve-Inch Pipe." By W. Spurgeon Maus, Engr., W. W. Div., Burbank, Calif. *Water Works Engineering*, March.

Dayton's New Treatment Plant

The Department of Water of Dayton, Ohio recently placed in operation the largest well-water softening and iron removal plant in the U. S. Construction costs for this 96 mgd plant amounted to $4,139,732. It included: 1—A 72-in. raw water by-pass line for use during the construction period. 2—Mixing, settling, and recarbonating basins of 17 mgd capacity. 3—Filter building. 4—Chemical building with storage bins, pneumatic chemical handling equipment, chemical feed machines, laboratory and offices. 5—Chemical unloading building with storage bins and railroad siding. 6—Filtered water reservoir of 5 mg capacity. 7—Wash-water tank of 200,000 gal. capacity and wash-water pumps. 8—Sludge lagoons of 16 acres area. Soda ash and lime are added, quick-mixed and flocculated. Sludge is removed from the basins by Monorakes to a sump, from which it is pumped to drying lagoons, with provision for returning all or part of it to the raw water duct. The effluent, after recarbonation by means of either underwater combustion, or of diffuser grids which dispense boiler flue gas, passes to sixteen 6 mgd filters. Chlorine and sodium hexametasphosphate are applied to the filter effluent.

"Dayton's New Treatment Plant." By Vernon R. Kneer, resident engineer. *Water & Sewage Works*, March.

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That cast iron pipe lasts over 100 years—

That cast iron pipe is inherently stronger, tougher, uniform in quality—

That cast iron pipe offers low installation costs, plus savings throughout its life because of low maintenance costs—

That cast iron pipe's long life and economy saves millions of tax dollars—

That cast iron pipe is the standard conduit for carrying water underground—

That before you experiment with substitutes in your waterworks system, you should study these facts and recognize the guarantee they offer: only cast iron pipe gives you a *proven record* of economy through *decades of use!* And experienced city officials have, for over three-quarters of a century, chosen Clow Cast Iron Pipe as the finest made. They know Clow offers consistent high quality, coupled with excellent service and fast delivery. They know *centrifugally cast* Clow Pipe offers longer life, greater economy and that it meets all currently approved specifications now in existence. Write today for complete, factual information.

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Laying a 12-Inch Main Across a River

Circleville, Ohio in 1952 replaced a defective 16-in. river crossing with a new 12-in. main, using Molox ball-and-socket pipe. The total length of the line was 600 ft., with 364 ft. in the stream bed. In connecting the new pipe to the old on each side of the river it was necessary to cut in two 16-in. valves on each side of the river (one in a duplicate river crossing). This was accomplished by using two air-driven A. P. Smith pipe cutters operating simultaneously 7 ft. apart. One cut-in was accomplished in 80 min., the other in 60 min.—the total time that the main was out of service.

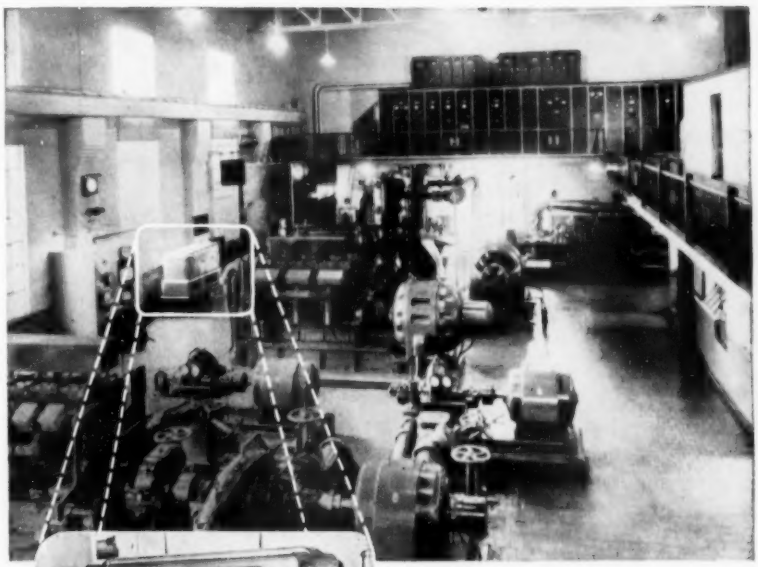
In laying the pipe in a depth of river of 3 to 8 ft., a ramp was built out into the river below the line of the pipe and a dragline rig was run out onto it for excavating the trench. Using material excavated from the trench, the dragline extended the ramp or jetty two-thirds of the way across the river. A similar jetty was built from the other tank to within 40 ft. of the first jetty, leaving that space open to pass the river, and the trench was completed. The new pipe line, coupled up on the bank, was moved across by combined pulling and pushing by a tractor at each end.

"New River Crossing Installed at Circleville, Ohio." By Ervin F. Leist, Manager, Water & Sewage Dept. *Water Works Engineering*, March.

Water Supply Of Nassau

Conditions on New Providence, an island of the Bahamas, are quite unusual. The rock is so porous—30 to 40% voids—that the sea water which percolates it rises and falls with the tide. Percolation of rain water is so rapid that there are no streams. This fresh water floats on the salt and is the only source of water supply, which is obtained by means of 17 trench systems and 268 pumps, since pumping too hard on any one well would bring in briny water. Of the pumps, 43 are electric, 4 hydraulic jet, 140 windmill and 81 pneumatic. These draw water from 700 shallow wells, none of which penetrates more than 8 to 10 ft. of fresh water or is drawn on for more than 2 gpm. No pump draws from less than 4 wells, or from an area of less than 100,000 sq. ft. Each well is rested for a week every 30 days, to permit the water level to adjust itself. The present sources have a total potential sup-

How Dubuque insures uninterrupted operation of its pumping station



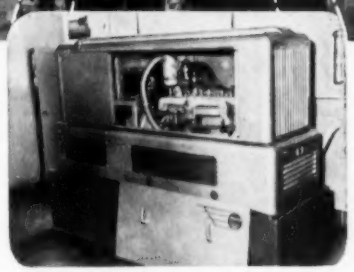
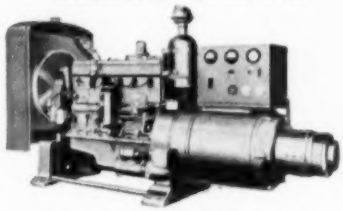


Photo of Dubuque (Iowa) installation shows Onan Model 25HN, 25KW, 120/208-volt, 3-phase, 4-wire, 60-cycle



New Onan 50KW Standby Plant

The Onan Model 50KA is designed for emergency use in pumping stations, sewage lift stations, civil defense or any installation with heavy load requirements. Write for specifications.

Continuous operation of Dubuque's Eagle Point water pumping station is assured during electric power interruptions by an Onan 25,000-watt, Model 25HN-4R Standby Plant. Five times since the Onan unit was installed in April, 1952, it has automatically cut in and furnished all the electric power for the following essential equipment: One ¼ h.p. electric motor for the station's oil burner, one ¼ h.p. electric motor for the condensate pump, four ⅝ h.p. and two ¼ h.p. motors for heating unit blowers, and thirty 200-watt lights for lighting the building.

The gasoline-driven standby plant also powers this additional equipment during extreme emergencies such as floods: Two 5 h.p., three 1 h.p. and six ⅓ h.p. electric motors for sump pumps and one 5 h.p. motor for priming the main pumping units.

Dubuque is one of the many communities and municipalities throughout the United States that is protected against power outages by Onan Standby Electric Power.

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Onan ELECTRIC PLANTS

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ply of 0.75 mgd and the average normal demand is 0.6 mgd. It is estimated that the total potential supply on the entire island is 1.85 mgd. This leaves little for industrial purposes. The cost of obtaining this supply is so great that the rates charged are necessarily high; and the rates increase as consumption increases over 1,000 gal. per week per residence, being much higher for more than 2,000 gal. It is hoped that some method will be evolved within the next ten years for desalting at reasonable cost the abundant supply of brackish water available.

"Water Supply of Nassau, Bahamas." By Geoffrey C. Stubbs and Arthur C. Langlois. *Journal, American Water Works Ass'n*, March.

Sulfur Cement Joints for Cast Iron Pipe

The author believes that plasticized sulfur cements, if prepared by the "Atlas" formula (available to all manufacturers) have sufficient strength and ductility to justify their use as jointing materials for bell-and-spigot cast-iron mains; that they do not disintegrate under conditions anticipated in a water line; and that they are not attacked by sulfur bacteria if they contain 0.6% of a bactericide, such as sodium silicofluoride. Although they seal by an initial reaction at the cast-iron interface, this action is not progressive. Because of their inherent ductility, plasticized sulfur cements do not contribute to stress within a pipe joint.

Discussing this paper, E. F. Wagner of the U. S. Pipe and Foundry Co. said that in a number of instances sulfur cements have contributed significantly to the corrosion of cast-iron pipe joints. He believes that certain weaknesses noted in field service have been insufficiently investigated and that adequate data have not been presented to substantiate many of the claims made by the author.

"Results of Research on Sulfur Jointing Compounds. By Raymond B. Seymour, Walter R. Pascoe and Robert H. Steiner, of Atlas Mineral Products Co. *Journal, American Water Works Ass'n*, March.

Other Articles

Water supply of East London, South Africa. "South African Water Shortage Relieved by Use of Tanker." By Theodor K. Cordes. Water Works Engineering, March.

"Scarborough, Ont., More Than Triples Its Plant Capacity." Water Works Engineering, March.

Supply through under-river pipe at Bellaire, Ohio. "New Type River Intake." By A. R. Todd. Water & Sewage Works, March. (See PUBLIC WORKS for February.)

The Texas Panhandle plain to obtain water from the Canadian river. "11 Texas Cities Join in Giant Pipeline and Dam Project." By B. H. Cruce, City Mgr., Pampa, Texas. PUBLIC WORKS, April.

"Records and Maps of the Water Distribution System." Why they should be kept and how. By Clifton C. Williams, Sr. Engr., Mobile, Ala. W. W. PUBLIC WORKS, April.

• • •

"Doc" Symons

(*Continued from page* 14)

To get back, for a moment, to that 39th meeting of NJSIWA, one of the high spots was the 4-ring circus put on by "Hedgepeth's Trained Seals" —The words were his, not mine. Personally, I thought that was one of the best presentations I've seen at a technical meeting.

Hedgepeth, Waste Consultant to American Cyanamid, introduced four of his sanitary engineering staff,

The
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Yokebox
A Better Meter Setting for Shallow Services
A simple, compact meter housing, complete with service valve, for warm climate installations. The modern and better way to install water meters. Gives better protection, keeps meter cleaner. An investment in easier meter reading, longer meter life and greater revenue.
Write for information on the Yokebox.
1. Small lid, clean meter, speeds meter reading.
2. Easy to handle, quickly installed as a unit.
3. Meter changes quick and easy, without cumbersome tools.
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each of whom presented one phase of how to solve a complex problem of organic waste treatment through pilot plant studies.

Listeners learned how to design a pilot plant, the functions of a pilot plant, how it should be operated for a break-in period and for all four seasons, and how the Biota is fundamentally the most important factor in any biological treatment plant.—Your boys deserved the applause, "Hedge"!

★ ★ ★

During the NJSIWA meeting, the local arrangements committee for the 28th Annual convention of the Federation, held a full dress committee meeting, 18 months before the convention is scheduled for Oct. 1955.—These Jersey fellows are on their toes and that promises to be a record meeting.

Andy Palmer, Supt. of Joint Meeting, Plainfield, N. J., cornered me in Atlantic City to say that he's a regular reader of this column. It's good to know that I have that kind of friends. Andy is now "going through the chairs" in NJSIWA, and is a member of the arrangements committee for the '55 Federation meeting. Sol Sied of New Brunswick heads the committee.

★ ★ ★

Purely Personal — Many of you know that I have a bet with Rick Johnson (JAWWA Editor and author of Percolation and Runoff) and Lois Schultz, Membership Secretary of AWWA. To wit: I've predicted that AWWA membership will hit 10,000 sometime in July, this year. (I made the prediction, first, nearly two years ago).

To help swell the count—and help me win the bet, no doubt—our son James, joined AWWA at the beginning of the year. I asked Lois how many 3rd generation AWWA'ers there had been. According to "Lo", the Ford family was first with, not one but, two third generation Fords, both named John —and apparently the Symons family is second, with one "Jimmy".

★ ★ ★

I'm All For It — When the IV Interamerican Conference of Sanitary Engineers meets in Brazil, July 25-31, under the auspices of AIDIS, it will be conducted under a full set of ground rules, which have been published in advance.

In addition to setting forth, who is a delegate, what sessions are to be held, and the topics to be covered, there are a few rules on the presentation of papers, to wit:

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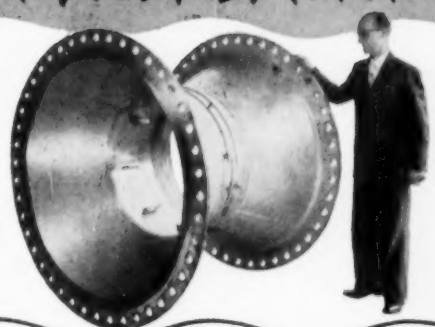

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more than 10 pages must contain a summary.

"Art. 19°—Those authors whose papers exceed the stated length may make a précis of it and shall read the summary and the conclusions when they exist.

"Art. 20°—Authors will be granted no more than 15 minutes at the utmost, for the reading of their papers. . ."

Maybe 15 minutes is a little short for presentation of papers, but I'm all for the presentation of abstracts, covering the principal points, in about half that time. In spite of all the papers I've listened to in these past dozen years or so, I've never become reconciled, to hearing an author read every "a", "an", and "the".

★ ★ ★

News Notes From Brushy Bend

—Sorry I had to miss Charlie Capen's talk at the final meeting of the North Jersey Water Conference in Paterson on April 2. Charlie, as all of you know, is a Cornell graduate who made good in a great big way as Chief Engineer of the North Jersey Water Commission and President of AWWA.

—Water works men of Northeast Ohio met at the Geneva water works on Route 534, three miles south of Grand River, on Mar. 31, for a plant inspection, followed by a chicken or fish dinner.

—The famed annual Planked Shad Dinner of the South Jersey Association of Water Superintendents, was held at the Salem Country Club on April 30. Walt Spencer of Merchcantville is Secretary and moving light.

—Don Bloodgood's famous Purdue Industrial Waste Conference has scheduled about fifty papers for May 10 to 12. Sorry I have to miss it this year.—Wait till next year, Don, and invite me again.

V.T.Y.—Doc Symons

• • •

Sewer Maintenance

(*Continued from page* 120)

tion is tabulated for immediate use or for regularly scheduled reports. Ultimately it is screened for the Annual Report, which is an excellent, simple presentation of essential departmental information.

Los Angeles has its emergencies. For better handling of these peak loads and for normal operation, 28 car and truck units in the Sewer Division are equipped with 2-way radio. While cruising to see crews in action the car is in constant communication with the central switchboard, talking with the office, the yards, and with crews at work.

This constant touch with all parts of the over-all job is aided by section maps of the city mounted on sheets about 16 x 20 ins. and bound in durable covers. Each crew can locate its work on these section maps, and anyone on the supervisory level can follow a crew with no loss of time.

Taking one type of work for particular attention, the city has been an experimental field for development of the Wayne sewer ball, made by the Wayne Sewer Ball Company of Long Beach, California. At present 4 of the machines are in operation, with 4 men in each crew. Beginning about July of 1952, these crews started to clean the entire system. The action of the sewer ball is illustrated in the pictures taken through Kroloy plastic pipe.

The spirally fluted rubber ball is inflated to almost the inside diameter of the sewer. Water piles up behind the ball to create a head sufficient to flush material ahead of the ball until it accumulates into a considerable quantity at the next manhole. As the ball approaches this manhole the men there prepare to lift the debris with buckets.

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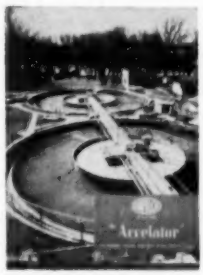

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Working in hip boots as protection against a sudden rise in the flow, they signal the operator of the sewer ball machine to tighten his cable, stopping travel of the ball, and the sludge pack of miscellaneous material comes into the manhole slowly enough to stop there.

Hoisting the accumulation to the surface and into the waiting truck is routine work. Once in the truck it is searched carefully for valuable articles. All salvage belongs to the crew. Jewelry, paper and silver money, bricks, broken stone, rags, sticks, glass, key chains and various other things are found in the mass of sand and silt. There's many a poor haul, and sometimes a pretty good one. The crews average about 2000 ft of sewer a day, and about half a yard of debris. But one crew took 2/3 of a yard from 75 ft. of sewer.

At this rate of 2000 ft. per crew, or 8000 ft. for four crews, more than 2600 days or 8 years will be required to clean the 4000 miles of sewers. Two more crews are to be added to speed up the work and a systematic year-round progression is to be established, insuring a clean system at all times.

Handling Emergencies

The real test of an organization comes when hit by a shocking emergency. This Sewer Maintenance team in Los Angeles won its laurels during the winter season of 1951-52. The rainfall rose perpendicularly to 26.21 ins., compared with a normal fall of 15.22 ins. and only 8.21 ins. for the year before. It ended the "long drouth," with a prodigious wallop. Property was damaged to the extent of millions of dollars. Soil was washed from hillsides to fill storm drains which were not designed to carry the runoff added to them by unprecedented residential development of hills and valleys.

Some storm drains were completely filled with debris. The equipment available for normal cleaning could not keep up with the job. More storms piled up too fast for predicting any relief. Private companies with heavier equipment were called in on contract, and $40,000 was spent in a short time in this way.

Ground water infiltrated the sewers in the Valley District until sewage was flowing out on the streets. The diluted sewage was bypassed into the Los Angeles River, using portable chlorinators to minimize danger to health in the area. About $71,000 had to be spent in ex-

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cess of the normal budget appropriation to put the sewers and storm drains back in good condition.

The emergency was handled with credit by all the Divisions involved, and crews were shifted back and forth as they were needed at different points. The 214 employees of the Sewer Maintenance Division worked 10,000 hours overtime to minimize damage already done, taking hurried steps to keep ahead of the growing menace, and to correct conditions as rapidly as possible to carry the load. All crews were on call night and day when they were not out on the work.

Complaints and Costs

In an operation of such scope, what does the Division hear from the public? Under 29 headings a record is kept of complaints. In 1950-51, with a rainfall of 8.21 ins., there were 2290 complaints. The following year, with 26.21 ins. of rain, there were 3153. Topping the list, 802 complaints were about catch basins stopped up, and 658 more were for sewers stopped. Then 477 were about noisy manhole covers. Others were 74 about lost articles, and 22 were reporting dead animals in catch basins.

The Division spent $534,821 for what may be called "on-the-street" maintenance in 1951-52, out of a total of $971,983. Total administration costs, $33,233, must include some charge for maintenance administration, as well as some part of $24,856 charged to equipment maintenance. All these items are proportionately higher than for the year before, in the ratio of the total of $971,983 for 1951-52 to $757,878 for 1950-51.

This is a lot of money for sewer maintenance in any city, but when it is spread out over a population of over 2,000,000, and weighted in relation to the high degree of specialization of work over 450 square miles of urban-populated area—larger than any other city area, it is reduced to a unit cost not approached in many cities.

The principle that essential facilities and procedures are only bigger in bigger operations is sound. But more specializing and more desirable functions can be added as the scope becomes larger. That is true not only here but in every large city. Judging the sewer maintenance here by standards of practical service to the public, Los Angeles is justified in being proud of its Department and its performance.

PUBLIC WORKS
EQUIPMENT NEWS

Published Monthly **May, 1954**

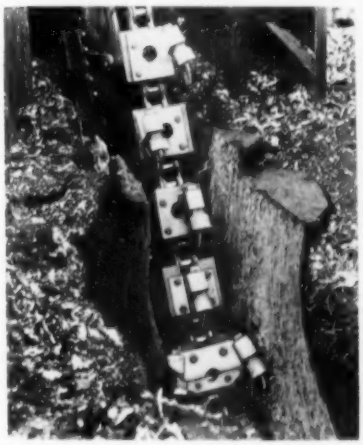
Broom Sweeps Street Dirt into Loader Bucket for Quick Disposal into Truck

You don't need a dustpan with this sweeper. It will sweep dirt—or leftover construction materials—from the street surface right into the bucket, and the bucket will load into a truck, just like any other Hough loader does. The manufacturer says: Loads trucks easily after refuse and dirt are swept into bucket; operates in either direction; cleans close to curb; reversible broom rotation permits sweeping into piles, or off highway shoulders; sweeps up excess stone on surface treatment jobs; fast attachment and removal; can be used to sweep pavement clean before surfacing. The "Load Sweeper" comes in four sizes, from 48 to 96 ins. for use with all models of Hough Payloaders. Control is through a 3-way hydraulic system. Full details from Sweeper Division, Clark-Wilcox Co., 118 Western Ave., Boston 34, Mass., from any Hough distributor, or circle No. 5-1 on the coupon.

No dustpan needed—street dirt is swept and loaded in one operation.

CHISEL-TYPE CUTTERS FOR TOUGH TRENCHING

Arps Corporation have introduced a new type chisel cutter for their tractor-mounted trencher. The chisel cutter is designed especially for digging in hard pan, adobe clay, caliche, frozen ground and very tough conditions. The cutters are forged of high carbon steel and are heat treated for extreme toughness. They are inserted in brackets bolted to the cutter chain. The cutting bits, when worn, are simply and quickly knocked out of the hold brackets, and are just as easily replaced by new, inexpensive bits. They can dig 8 ins. through 18 ins. wide. The new cutters supplement the standard, slicer cutters used for wet, sticky soils, gumbo, heavy clay and normal soils.



Hard pan, frozen ground or stumps do not stop this new chisel cutter.

More from Arps Corporation, New Holstein, Wisc., or use the coupon, circle No. 5-3.

Goose-Necking Boom on Truck Crane Solves Travel Problems

Overhead clearance is often a problem when moving a truck-mounted crane from job to job. Here is a solution to that problem. Pitman has developed a goose-necking crane, the boom of which folds down simply by pushing a lever—and in a matter of seconds. This crane will reduce still more the costs of handling pipe, lighting poles, steel and many other items. When the boom is unfolded, it has the same strength and capacity as the standard Pitman boom—4 tons at 25 ft. and 3 tons at 37 ft.; and additional boom lengths up to 59 ft. are available. In addition to the goosenecking feature, the standard 25-ft. and 37-ft. booms are hinged at the side and can be folded for travel in less than 5 minutes. This fine new equipment is available on the Pitman Model 80 4-ton truck crane, which is so designed that a trailer can be hauled along behind it, using the truck on which the crane is mounted. The crane can load directly onto or off this trailer. More data from Pitman Mfg. Co., 300 West 79th Terrace, Kansas City 14, Mo., or circle No. 5-2 on the coupon.

Boom folds out of way when traveling, speeds up work on the job.

Measuring Tape Uses Modern "Miracle" Fibers

Late developments in fabrics have been utilized by Lufkin to produce

a tape that is resistant to abrasion, cracking, mildew, moisture and temperature changes. It has great dimensional stability even after repeated wettings and dryings. Also, it is a non-conductor and its use will avoid the possibility of unpleasant or dangerous electric shocks. There is a four-color folder that will tell you all about this fine new measuring tape, which is called the "Hi-Line." Get this from Lufkin Rule Co., Saginaw, Mich., or circle No. 5-4 on the coupon.

Trencher Replaces 25 Pick-Shovel Men

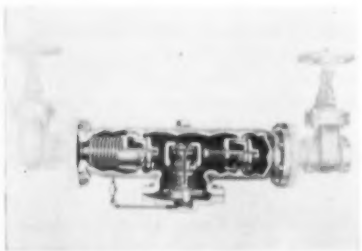
For all sorts of trenching to 42 ins. deep and 12 to 18 ins. wide, the Everett trencher is claimed to have many advantageous features. It is a tractor-mounted bracket-type machine, designed for use with a Ford or Ferguson tractor. Operating from the tractor power take-off, the trenching unit is raised or lowered by hydraulic power. A safety

Light trencher, on Ford or Ferguson tractor, cuts to 42 inches deep.

slip feature stops the bucket line when pipe lines, rock, or other hazardous digging is encountered. Controls are easy to reach and the outfit is highly mobile. Full details from Earth Equipment Corp., 2036 Sacramento St., Los Angeles 21, Calif., or circle No. 5-5 on the coupon.

Protection of Cross Connections in Water Lines by Backflow Preventers

Approved backflow preventers for all pipe sizes from 1 to 16 inches for protection of water lines are

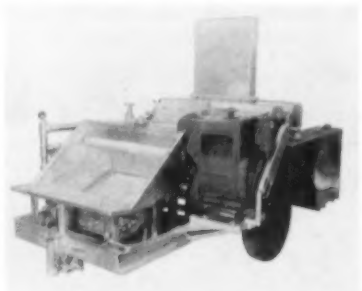


"Reduced pressure" principle is utilized in this backflow preventer.

now being marketed by Backflow Engineering & Equipment Co., Los Angeles, Calif. These devices were primarily designed to protect between approved and unapproved water supplies, frequently known as dual or secondary services, and for industrializing lines within plants and consumers' premises. This backflow preventer utilizes the "reduced pressure" principle and consists of two check valves and a monitoring relief valve system which automatically maintains a "zone" between the check valves in which the pressure is always lower than the inlet pressure and also provides visual indication if repairs are needed. Complete information from the manufacturer, or circle No. 5-6 on the coupon.

Asphalt Mixer Handles Hot or Cold Mixes

The new HTD-JR McConnaughay asphalt mixer provides for versatile handling of both hot and cold mixes. As a continuous mixer, it will handle 120 tons of cold mix per hour

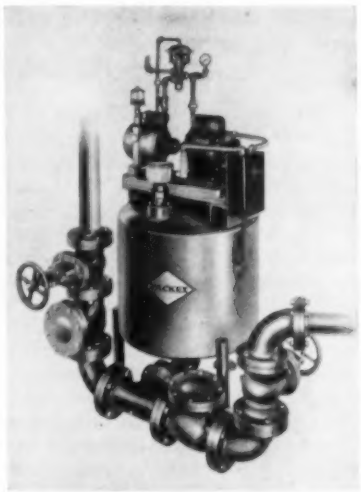


Continuous asphalt mixer provides correct proportioning of bitumen.

or 20 tons of hot mix. It is especially recommended as a continuous mixer for the production of cold mixes. The unit has a metal conveyor 24 ins. wide for proportioning the aggregate; a 55-gal. per minute positive displacement pump provides for proper proportioning of the bituminous material. Further information from K. E. McConnaughay, Lafayette, Ind., or circle No. 5-7 on the coupon.

Solving Small-Volume Sewage Handling Jobs

Designed especially for handling sewage from small subdivisions, small residential areas, buildings, small schools and similar places, Yeomans has a packaged pneumatic ejector for handling up to 20 gpm of sewage (or other similar liquid) to a 20-ft. head. Inlet and discharge



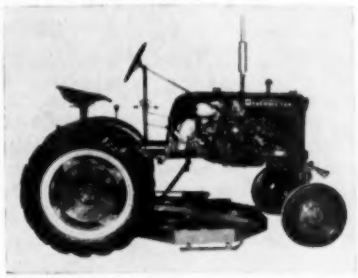
Handles up to 20 gpm at 20-ft. head of sewage or other types of waste.

fittings are 3-inch or 4-inch. An hermetically sealed pot eliminates the escape of odors or gas. Any solids that can enter the unit can be discharged. Shipment is made assembled so that inlets and outlets are ready for immediate connections. Operation is on standard house current. A good folder—No. 4420—gives detailed ratings and design information. Sent on request to Yeomans Bros. Co., 1999 N. Ruby St., Melrose Park, Ill., or circle No. 5-8 on the coupon.

The Latture Rolo-Crusher employs a new principle for crushing rock. It consists of a pair of rotors, one concave and the other convex, each of which is corrugated axially, the corrugations being constantly spaced around the entire peripheral surface. These rotors move in opposite directions, are independently driven, and are accurately timed so that the corrugations are in constant mesh, thus preventing slippage and virtually eliminating flat or elongated particles. This crusher is manufactured by the Waldrip Engineering Co., Hollydale, Calif.

Rotary Mowers Will Mulch Leaves, Shred Stalks, Weeds and Brush

These Wood rotary mowers, which are made specifically for the IHC Cub and Super "A" tractors, cut a 42-inch swath. They are mounted under the tractors and a little offset, so they can cut close to fences, buildings and walls. The size and method of mounting make them specially suited for cutting and shredding stalks, weeds and brush; mowing road shoulders; and mulching leaves. For the latter work an attachment is necessary, permitting elimination of the costly job of raking, hauling and burning leaves. Full information from Wood Bros. Mfg. Co., Oregon, Ill. This equipment also is included in the IHC Special Duty Equipment Manual, available at any IHC dealer; or circle No. 5-9 on the coupon.



Cutting and mulching are combined in this rotary type roadside mower.

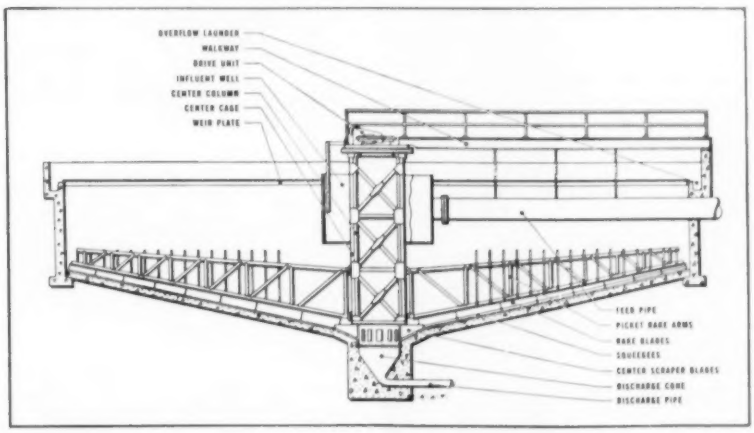
Sludge Thickening Process Increases Digester Capacity

A continuous process for thickening sludge, applicable to both primary and secondary sludge treatment, has been announced by Dorr. The process entails continuous withdrawal of the sludge and controlled thickening. Sludge volume is decreased as much as 50 percent as compared to that produced by conventional methods, and digester supernatant is eliminated. The reduction in sludge volume results in increasing the capacity of the digesters and of other sludge handling facilities as well. The process, with minor variations, is applicable to activated sludge plants and to those using either high or low rate filters.

This procedure, called the Densludge process, can be utilized to increase greatly, and at a relatively low cost, the capacity of sludge handling facilities in existing plants; while in new plants smaller sludge handling and disposal equipment will be required. The thickener is available in sizes from 10 to 100 ft. in diameter. Full information from The Dorr Co., Barry Place, Stamford, Conn., or circle No. 5-10 on the coupon.

Diesel Generators Can Help in CD and Emergencies

Not only can these diesel generating sets be of tremendous usefulness in time of disaster, but they can be used for many kinds of utility work. For disaster and civil defense work, or as a standby, automatic control activate the 10 to 15-kw set the instant power fails. An advantage of the diesel unit is that there is no carburetor in which gasoline may evaporate with consequent starting failure. The engine and generator are mounted on a trailer with pneumatic tires, providing maximum mobility, if desired. This can be handled easily by a light truck. The unit provides ample power for operating radios and other communications equipment. More information from R. H. Sheppard Co., Hanover, Pa., or circle No. 5-11 on the coupon.



Sludge volume is decreased in the Dorr Densludge process, with resultant increase in the sludge handling capacity of plants.

Finding Valves and Pipes Quicker

Working in cooperation with faculty personnel of the Engineering College, University of Cincinnati, Aqua Survey & Instrument engineers have perfected a copper-shielding type of inner construction which semi-encloses the needle swing area of their valve box locator. This construction sets up a series of magnetic fields which act as "brakes" on the swing of the needle. The result, say the engineers, is an absolute minimum of needle swing which means speedier and more accurate locations of missing valves, valve boxes, etc.

The needle isn't "nervous" in this accurate pipe and valve locator.

The new instrument has been exhaustively tested under actual working conditions. W. F. Becker, chief inspector of the Ohio Fuel Gas Company, Columbus, Ohio, summed up his experience with the new Aqua Locator in these words: "After a month of field testing in every type of soil and under all weather conditions, our men report that your new Aqua locator is so greatly improved there is simply no comparison with the previous model . . . no needle nervousness . . . pinpoint accuracy. It has our unqualified approval!" More from Aqua Survey & Instrument Co., 2518 Leslie Ave., Cincinnati, O., or circle No. 5-12 on the coupon.

ALL-STEEL TOOL BOX IS TRAILER-MOUNTED

This tamperproof, pneumatic-tired all-steel tool box has been announced by Aeroil Products Co. Featuring rigid telescoping stand

Tamperproof tool box on rubber-tired trailer has capacity of 2,000 pounds.

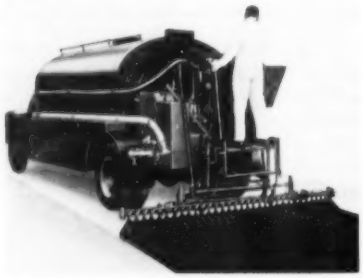
legs at each end, it has an overall length of 114½ inches, including tow frame; overall height of 49 inches; and loading height of 41 inches. The load capacity is 2000 lbs. and it can be used by contractors, highway departments, public utilities, waterworks, maintenance and municipal departments, pipe line companies, ets. It has one padlock that protects the entire box, enabling one man to open or close both lids from a single position. In locking, the handles pull the covers in tight, where they lock under the box rim, making it impossible to open either cover unless the locking handles are released. The tow eye can be placed at any height (from 24" to 38") to accommodate various towing trucks. Partitions and sliding trays are standard features, affording ample storage space for small tools, parts, etc. More from Aeroil Products Co., Inc., 69 Wesley St., South Hackensack, N. J., or circle No. 5-13 on the coupon.

Hydraulic Loader Designed for Fordson Major Tractor

The 4-way hydraulic loader by American is said to be the first such unit made specifically for use with the Fordson tractor. It will work to a height of 25 ft. Attachments available include: A dozer blade 78 ins. wide, made of quarter-inch steel; a V snow plow, 80 ins. wide and 27½ ins. high; a heavy-duty all-steel platform with guard rail for use in place of a ladder or scaffold; and dirt and snow buckets up to 20 cu. ft. capacity. For more information, write American Road Equipment Co., Omaha, Nebr., or circle No. 5-14 on the coupon.

Standardized Type of Bituminous Distributor

A method of standardization of bituminous distributors has been adopted by Municipal Supply Co. so that one standard type includes identical tank structures, operating controls and unit assemblies, insuring immediate availability of assemblies and standard parts. Among the advantages claimed for this distributor are: Full control by the operator at all times; even temperature for the bitumen; instantaneous starts; full coverage, with sharp



Full coverage of area to be sprayed is only one advantage of this unit.

edges; lateral movement of the spray bar; spray width from 2 to 24 ft.; and swing up section. More data from Municipal Supply Co., South Bend, Indiana, or circle No. 5-15 on the coupon.

Reduces Sweeping Time Requirements Substantially

With the operator seated on the front of this Wilshire power sweeper, he has a close-up, direct view of the surface ahead of him as well as on either side of the sweeper. This enables him to sweep up close to

Power sweeper operator rides up at the front, can see where he is going.

parked cars and trucks, machine tools, walls, posts and other obstructions without damage to them or the sweeper. Side bumpers of the roller type eliminate danger of scratching paint or equipment. With large diameter dual wheels on the front for steering, the operator steers from the left as when steering an automobile, with a wide-arc steering crank to make quick, easy turns with either hand. The extra maneuverability of the Wilshire sweeper substantially reduces sweeping time in even the most difficult areas. For illustrated brochure write Wilshire Power Sweeper Co., Glendale 4, Calif., or circle No. 5-16 on the coupon.

Heavy-Duty Backfiller for Big-Capacity Pipe Lines

A one-man operated, fast moving, big-capacity backfiller for pipelines and heavy construction work is announced by The Cleveland Trencher Company. The new machine is especially effective in mud, sand and rocky soil and in swamps and hilly terrain. Employing a 7-ft. backfill board, the machine backfills as it travels, providing continuous operation under one-man control.

The adjustable boom can be tele-

Backfiller with 7-ft. board can be used as side crane for laying pipe.

scoped from 19 ft. to 27 ft., and easily removed for an 8-ft. hauling width. As a side crane the 190 has a 50,000-ft. lb. capacity figured from the edge of the crawler—10,000 pounds 5 feet out, 5000 pounds 10 feet out. Its spring-cushioned winch drum hand brake provides steady control for crane work. More information from Cleveland Trencher Co., Cleveland 17, O., or circle No. 5-17 on the coupon.

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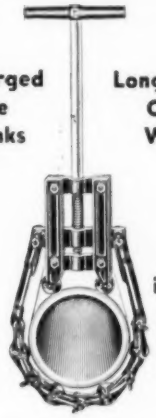

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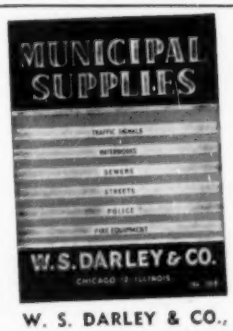

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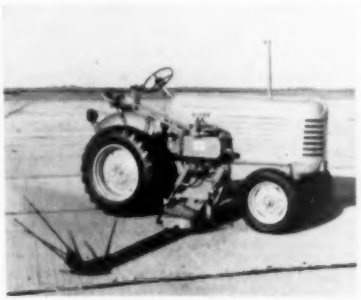
W. S. DARLEY & CO., Chicago 12

This Mower Maintains Constant Cutter Bar Speed

Highway mowing offers special problems which are unlike those of field mowing. Because the going is usually rough, the tractor must vary its speed, often traveling at a very low rate. In the Anderson mower, the speed of the cutter bar is not affected by the speed of the tractor; and the cutter bar speed is easily and quickly adjustable to meet the varying conditions of light brush, thick weeds, bunch grass, etc. Another important element is the ability to adjust quickly the height of cut. This can be done with the Anderson mower by a single control, without affecting the angle of the cutter bar. A flow control valve is provided which bypasses unneeded oil from the hydraulic motor back to the reservoir; and this flow control is adjustable to meet mowing requirements. If the motor stalls, when cutting scrub and saplings, a mere reverse frees it without backing up. A lot of information on this highway mower is available from A. C. Anderson Co., Wildwood, N. J., or circle No. 5-18 on the coupon.



CUTTER-BAR speed is always the same, no matter what the tractor speed is.

Impact Type Crusher Can Produce Small-Sized Stone

This impact type crusher when used with many types of rock can be operated in a closed circuit to produce 100 percent of stone passing 1-inch. It is designed for non-abrasive rock. Maximum capacities, when producing minus 3-inch, is up to 350 tons/hour; producing minus 2-inch, to 275 tons/hour; and minus 1-inch to 150 tons/hr. Horsepower required is 150 to 250. Excellent folder (Bulletin D-3648) is available which shows details of construction and product gradation at various hammer velocities. More from Kennedy-Van Saun Mfg. & Eng. Corp., Danville, Pa., or circle No. 5-19 on the coupon.

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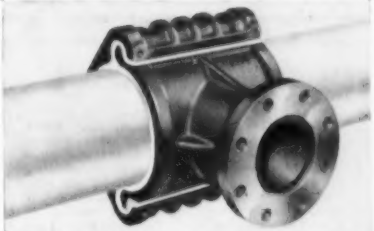

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One-Application Weed Spray Replaces Repeated Cutting

A new type of weed spray, called the N P Weed Killer, comes in the form of a readily soluble powder which requires no agitation to keep in suspension. An agent is incorporated which has wetting and spreading abilities, so that the solution wets waxy surfaces of leaves and plants and increases contact and penetration. While this preparation kills by contact, it also acts by translocation to kill roots; heavy doses will sterilize the soil so seeds will not sprout. It is non-selective, that is, for use where no growth is wanted. It can be sprayed, sprinkled or used as a dry powder; it is non-corrosive, non-volatile and non-flammable. Full data from C. B. Dolge Co., Westport, Conn., or circle No. 5-20 on the coupon.

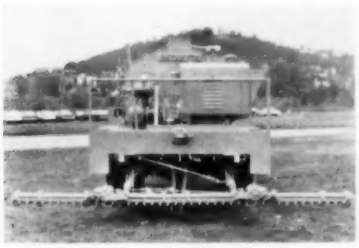
An aluminum tapping machine with several distinctive advantages is now being manufactured by Hays Manufacturing Co., Erie, Pa. The new Model "B" is made of high strength aluminum alloy, reducing the weight and making it easier to carry and operate. It weighs 36 lbs. and requires a minimum working space. This machine will drill, tap and install the corporation stop without disassembling the machine and the complete operation is performed under full pressure. It can handle all standard makes of stops, from ½-in. through 1-in. Accessories include saddles, chain, wrenches, etc.

"Violite" protects surface coatings against the deteriorating effects of ultra-violet light and ozone, and has resistance to excessive humidity or salt-laden atmospheric conditions. It also prevents oxidation on metallic surfaces. The material film hardens upon evaporation and is dust free a few minutes after application. It has been formulated by Booker-Cooper, Inc., 6940 Farmdale, North Hollywood, Calif.

Centrifugal Pumps, light in weight, self-priming, said to exceed AGC ratings, and of improved design are announced by Universal Mfg. Co., Berkeley, Calif., or Louisville 2, Ky. These are adapted to general construction and dewatering work and will handle muddy as well as clear water. They are furnished with gasoline engine or electric drive, or with a standard transmission head for belt drive.

New Distributor Bar Gives Double Lap Spray

Littleford has engineered a new spray bar to simplify the spraying of asphalt, tar, emulsion, road oils and cut back. It is mechanically operated full circulating up to 24



Distributor spreads to 24 ft. wide, handles asphalt, tar and emulsion.

feet in width. The simplicity of operation is an important feature: By pulling a lever all nozzles spray in unison; by pushing the same lever the nozzles stop spraying instantly with no drip. Half the bar, or any length of bar will spray. Each nozzle has an individual valve and the nozzles are spaced on 4-in. centers. The bar gives a complete double lap spray. Other features include positive lock which holds the folded ends when traveling; and a quick acting coupling which makes the removal or addition of spray bar sections easy and quick. The bar is "Lite-Wate", weighing 1/3 less than ordinary spray bars and is easily handled without effort by one man. Full data from Littleford Bros., Inc., Cincinnati 2, O., or circle No. 5-21 on the coupon.

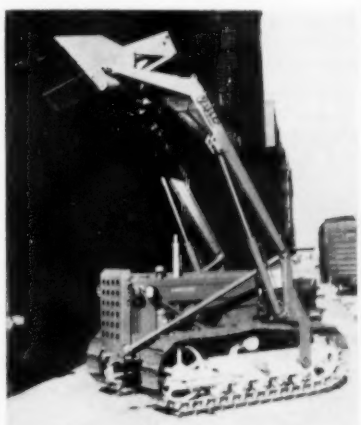
Power Shovel Designed for City-County-Town Jobs

Designed to meet the many requirements of counties, towns, cities and similar public works projects, and for the small contractor on such jobs, Osgood-General has produced the new Model 250, which is a ¾-yd. crawler mounted crane-shovel-dragline-backhoe. The cab covers the entire machine and gives the operator plenty of room to work in and to service the machine. The standard boom length is 35 ft. with inserts of 5, 10, 15 and 20 ft. available, making the unit especially fine for pipe line laying or similar work. The hoe boom is 16½ ft. long and standard dippers are available to 36 ins. wide. You can have your choice of gasoline or diesel power. A good many points not mentioned here are covered in Specification 5420, which you can get from Osgood-General, Box 515, Marion, Ohio, or by circling No. 5-22 on the coupon.

Crane shovel-dragline-backhoe has a big field of use in city-county work.

The Acme Curing Can for field curing of concrete test cylinders has been developed by E. W. Zimmerman, 228 N. La Salle St., Chicago, Ill. This equipment provides controlled humidity and temperature for the proper curing of cylinders regardless of weather conditions.

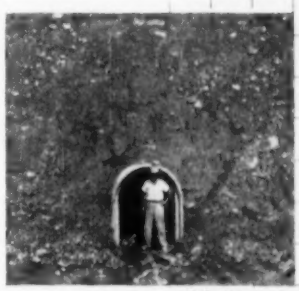
A hydraulic loader for John Deere crawler tractors has been announced by Valley Manufacturing Co., Valley, Nebr. This will fit three, four or five-wheel rollers. The lift capacity is 2400 lbs., using the standard built-in John Deere pump. It is designed with a double acting hydraulic cylinder so that the operator has power when either raising or lowering, giving faster operation. This equipment comes with a 10.8-cu. ft. utility bucket for sand, rock, gravel, etc. Other attachments include a straight or angle-blade; a scoop designed to handle light materials as well as snow; a boom; and made-to-order hydraulic tongs for logging operations. Loader is painted in colors to match the tractor.



Fits on Deere crawler tractors, lift capacity to 2400 lbs. Does many jobs.

flatten cost curves with UNIVERSAL Flat-base pipe

conduits



highways

industry

Pre-cast concrete pipe saves up to 30% over built-in-place methods. Easy installation. Up to 100 feet of UNIVERSAL Flat-base pipe can be laid and covered in one day!

Built for heavy duty, low maintenance. Flatten your cost curves . . . specify UNIVERSAL Flat-base concrete pipe. Write . . . we'll tell you more.

THE UNIVERSAL CONCRETE PIPE COMPANY
297 SOUTH HIGH STREET
COLUMBUS 15, OHIO
A subsidiary of the American-Marietta Co.

INDEX OF ADVERTISEMENTS

Air Placement Equip. Co. ... 173
Alabama Pipe Co. ... 202
Albright & Friel, Inc. ... 190
Alvord, Burdick & Howson ... 190
Allis-Chalmers Co. ... 20 & 21, 76
American Bitumuls & Asphalt Co. ... 80
American Cancer Society ... 197
American Concrete Pressure Pipe Assn. ... 38
American Cast Iron Pipe Co. ... 61
American-Marietta Co. ... 181
American Well Works ... 154
Anderson Inc., A. C. ... 142
Anthracite Equipment Corp. ... 172
Arps Corporation ... 140
Atlas Mineral Products Corp. ... 176
Austin Western Co. ... 41
Automatic Signal Division Eastman Industries, Inc. ... 67
Ayer-McCarel Clay Co., Inc. ... 49

Baker, Jr., Michael ... 190
Baker & Co., Inc., R. H. ... 152
Bannister Engineering Co. ... 190
Barber-Green Co. ... 43
Barker & Wheeler ... 190
Bell, Howard K. ... 190
B-I-F Industries ... 72 & 148
Bigelow-Liptak Corp. ... 55
Black & Veatch ... 190
Blackburn Smith Mfg. Co. ... 177
Blaw-Knox Company ... 137
Bogert Assoc., Clinton L. ... 190
Bowe, Albertson Assoc. ... 190
Bowerston Shale Co. ... 49
Brown & Blauvet ... 190
Brown Engineering Co. ... 190
Buck, Seifert & Jost ... 190
Builders-Providence, Inc. ... 72
Burgess & Nipple ... 190
Burke, Inc., R. H. ... 190
Burns & McDonnell Engr. Co. ... 190
Butler Manufacturing Co. ... 34

Caird, James M. ... 190
Camp, Dresser & McKee ... 190
Capitol Engineering Corp. ... 190
Cast Iron Pipe Research Assoc. ... 8 & 9
Caterpillar Tractor Co. ... 4, 86, 163
Chain Belt Company ... 63
Champion Corp. ... 166
Chester Engineers ... 190
Chicago Bridge & Iron Co. ... 129
Chicago Pump Co. ... 3
Classified Ads ... 198
Cleveland Trencher Co. ... 44
Clipper Manufacturing Co. ... 17
Clow & Sons, James B. ... 184
Cole & Sons, Chas. W. ... 190
Combustion Engineering, Inc. ... 84
Consoer, Townsend & Assoc. ... 190
Corey Mfg. Co. ... 197
Cotton, Pierce, Streander, Inc. ... 190
Cradle Engineering Co. ... 190

Darley & Co., W. S. ... 197
Darling Valve & Mfg. Co. ... 31
DeLeuw, Cather & Co. ... 190
Dempster Brothers, Inc. ... 27
Detectron Co. ... 56
Dickey Clay Mfg. Co., W. S. ... 49
Dietz, R. E., Company ... 52
Dixon Jos., Crucible Co. ... 139
Dolge, C. B. ... 151
Dorr Co. ... 36 & 37
Dresser Industries, Inc. (See Roots-Connersville Blower Corp.) (See Dresser Mfg. Div.)
Dresser Mfg. Div. ... 73
du Pont De Nemours & Co., Inc. E. I. ... 10 & 57

Ellis & Ford Mfg. Co. ... 197

Fairbanks, Morse & Co. ... 75
Federal Sign & Signal Corp. ... 68
Falker Manufacturing Co. ... 155
Fisher Research Lab. Inc. ... 157
Fisher & Porter Co. ... 168 & 169
Flexible Pipe Cleaning Co. ... 188
Flexible Sales Corp. ... 50
Foote Construction Equip. Div. ... 145
Ford Meter Box Co. ... 186
Foster Engineering Co. ... 187

Galion Iron Works & Mfg. Co. ... 203
Gannett, Fleming, Cordray & Carpenter, Inc. ... 190
Gilbert Associates, Inc. ... 191
Golden Anderson Company ... 39
Grace Sign & Mfg. Co. ... 138
Graver Water Conditioning Co. ... 23
Greeley & Hanson ... 191
Green Co., Howard R. ... 191
Greenlee Tool Co. ... 18
Grote Manufacturing Co., Inc. ... 54

Hamilton Kent Mfg. Co. ... 51
Harte Co., John J. ... 191
Hauck Mfg. Co. ... 166
Havens & Emerson ... 191
Hays Manufacturing Co. ... 158
Hazen & Sawyer ... 191
Heltzel Steel Form & Iron Co. ... 126
Hill & Hill ... 191
Holmes Co., Ernest ... 53
Homelite Corp. ... 83
Homestead Valve Mfg. Co. ... 171
Hooper, William T. ... 191
Hotel Lenox ... 198
Hotel Tuller ... 172
Hough Co., Frank G. ... 12 & 13
Huber Mfg. Co. ... 81
Hunt Machine Co., Rodney ... 35
Hydrauger Corp., Ltd. ... 54

Industrial Materials Co. ... 49
Infilco Inc. ... 189
International Salt Co., Inc. ... 19

Jaeger Machine Co. ... 85
Jeffrey Mfg. Co. ... 82
Johns Manville ... 74
Johnston Pump Co. ... 25
Jones, Henry & Williams ... 191
Jones, John Wiley, Co. ... 79

Kennedy, Clyde C. ... 191
Kerrigan Iron Works, Inc. ... 161
Knowles, Inc., Morris ... 191
Koehring Company ... 16

Lamar Pipe & Tile Div. ... 181
Leopold, F. B. ... 131
Le Roi Company ... 32 & 33
Lewis, Harold M. ... 191
Link-Belt Co. ... 133
Littleford Bros., Inc. ... 60
Lozier & Co., Wm. S. ... 191

M. & H. Valve & Fittings Co. ... 143
Maxim Silencer Company ... 56
McWane Cast Iron Pipe Co. ... 150
Metcalf & Eddy ... 191
Morse Bros. Machinery ... 179
Mueller Co. ... 29

Natco Corp. ... 49
National Clay Pipe Mfrs., Inc. ... 6
Nat. System of Garage Ventilation, Inc. ... 156
Nichols Engineering & Research Corp. ... 2

Oliver Corporation ... 135
Onan & Sons, D. W. ... 185
Orangeburg Mfg. Co., Inc. ... 28
Osgood General ... 70

Pacific Coast Borax Co. ... 136
Pacific Flush Tank Co. ... 15
Pacific States Cast Iron Pipe Co. ... 150
Palmer & Baker, Inc. ... 191
Palmer Filter Equip. Co. ... 66
Permutit Company ... 77
Phelps Dodge Refining Corp. ... 178
Phelps, Inc., Boyd E. ... 191
Pirnie Engineers Malcolm ... 192
Pitman Mfg. Co. ... 187
Pitometer Company ... 192
Pittsburgh Des Moines Steel Co. ... 183
Pomona Terra-Cotta Co. ... 49
Portland Cement Assn. ... 30
Pratt Co., Henry ... 156
Preload Engineers, Inc. ... 192
Proportioneers, Inc. ... 148

Ranney Method Water Supplies Inc. ... 140
Rensselaer Valve Co. ... 71
Robert & Co. ... 192
Roberts Filter Mfg. Co. ... 40
Rockwell Co., W. S. ... 175
Roots-Connersville Blower Corp. ... 22
Russell & Axon ... 192

Seaman Motors, Inc. ... 165
Seay Co., Irby ... 192
Shawnee Mfg. Co. ... 60
Sherman Products, Inc. ... 26
Shunk Manufacturing Co. ... 24
Silent Hoist & Crane Co. ... 151
Simplex Valve & Meter Co. ... 58
Skinner Co., M. B. ... 197
Smith Co., S. Morgan ... 11
Smith & Gillespie ... 192
Spanski & Williams ... 192
Sparkler Mfg. Co. ... 47
Stanley Engineering Co. ... 192
Stillson Assoc., Alden E. ... 192

Taylor & Co., W. A. ... 202
Tennessee Corp. ... 45 & 156
Texas Vitrified Pipe Co. ... 49
Todd Shipyards Corp. ... 177
Toledo Pipe Threading Mach. Co. ... 48
Trickling Filter Floor Institute ... 49
Trojan Mfg. Co. ... 62

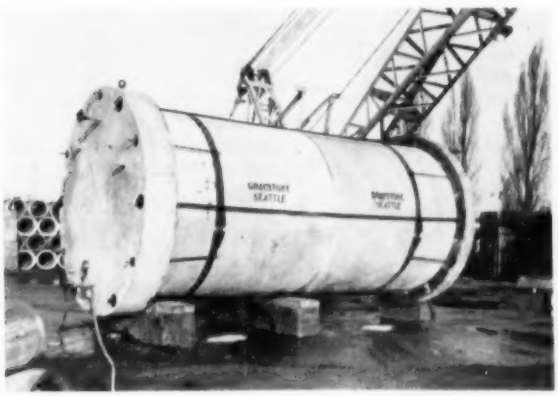
U. S. Pipe & Foundry Co. ... 159
Uhlmann & Associates ... 192
Universal Concrete Pipe Co. ... 199

Wachs Company, E. H. ... 153
Wallace & Tiernan Co., Inc. ... Back Cover
Warrick Co., Charles F. ... 62
Water Seals, Inc. ... 14
Water Works Manual & Catalog File ... 46
Watkins, J. Stephen ... 192
Westinghouse Electric Corp. ... 64 & 65
Weston Co., L. A. ... 172
Whitman, Requardt & Assoc. ... 192
Wincharger Corporation ... 59
Wolverine Tube Division Calumet & Hecla, Inc. ... 147
Wood Brothers Mfg. Co. ... 164
Wood Co., R. D. ... 149
Woodward Iron Co. ... 160
Worthington Corp. ... 69 & 70

—Worth Seeing

Photo courtesy Allis-Chalmers Mfg. Co. Tractor Div.

Display of an Allis-Chalmers Model D motor grader with shoulder maintainer which is interchangeable with rear-end loader in the Drott Tractor Co. Inc. show room, Milwaukee, during the 1954 Wisconsin Highway Conference. This simulated highway stressed the safety factors of good road shoulders properly maintained.



This little 84-inch Graystone concrete pipe in Seattle is proving that not only it but the TYLOX Hamilton Kent rubber jointing gaskets can take it—to the tune of 75,000 lbs. + pressure on the end plugs.

After the first blast by Contractor Harry O. Wyse of Lexington, working with Atlas Powder Co. dynamiting experts, the bridge is down but the piers stand undamaged, as shown in the photo at right.

When a loaded truck crashed through the far span of this Brooklyn Bridge (in Kentucky) problems arose for more than the half-drowned truck driver. The rest of the bridge had to come down quick—without harming the soft limestone piers that would carry the replacement bridge.

Next move, the wooden flooring was removed, leaving only a catwalk (left) for the dynamiters to cross on.

Adjustable VALVE BOXES

TWO PIECE

sliding or screw type cast iron valve boxes for covering 4" through 10" valves for water or gas. Rugged construction for lifetime service. 5¼" shaft. Extensions as required.

THREE PIECE

valve boxes supplied with separate bases are available in sliding or screw type. Made with 5¼" and 7" shafts with extensions as required. Also, a complete line of service and roadway Boxes.

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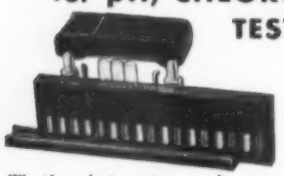
"couldn't do without my
TAYLOR COMPARATOR
for pH, CHLORINE TESTS"



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WORTH TELLING

by Arthur K. Akers

★ **THE FOXBORO COMPANY** (Mass.), instrumentation, is building a new factory in Dallas. Other branch factories remain in San Francisco and Pittsburgh.

★ **HENRY W. HITZROT** of the Dorr Company, Inc., has taken over the job of director of the Water and

Mr. Hitzrot being sworn in

Sewage Industries and Utilities, in Washington; succeeding Tom Quigley of Wallace and Tiernan, who remains as consultant.

★ **JIM MASKELL,** Irvington, N. J., now represents W. H. Stewart Inc. of Syracuse, sewer cleaning specialists.

★ **JOSEPH DIXON CRUCIBLE COMPANY** names Roland J. La France manager of paint sales.

★ **JOHN FORD** of Ford Meter Box Company quotes us (and dates us!) in their April calendar bulletin as an authority on the interurban electric lines of yester year. We admit it!

★ **HUGH GLEN** is new president of Johnston Pump Company, Pasadena, Calif.

★ **INTERNATIONAL INCINERATORS** Inc., Atlanta, recognizes indefatigable industry by electing Frank M. Tobin vice president and general manager.

★ **UNFLINCHING** before the call of duty, we went to the Stork Club. There we helped the Meter-Ad Corporation launch a new painless way of sizeably augmenting municipal revenue from parking meters. Any city or traffic engineer wishing to know more will find us cooperative.

★ **JERRY FLEET** is now G. A. Fleet Company, in White Plains, N. Y., representing Blackburn - Smith Manufacturing Company, ejectors; Komline - Sanderson Engineering Corporation, sewage filters; Marlow plunger pumps; Morris Machine centrifugals; Process Engineers, sewage treatment equipment; and Sanitary Specialties, Chemstone slide gates.

★ **GRAVER WATER CONDITIONING COMPANY,** New York, appoints David M. Spillane Chicago district manager; and establishes an industrial waste treatment department under Robert J. Keating in New York.

Mr. Barber

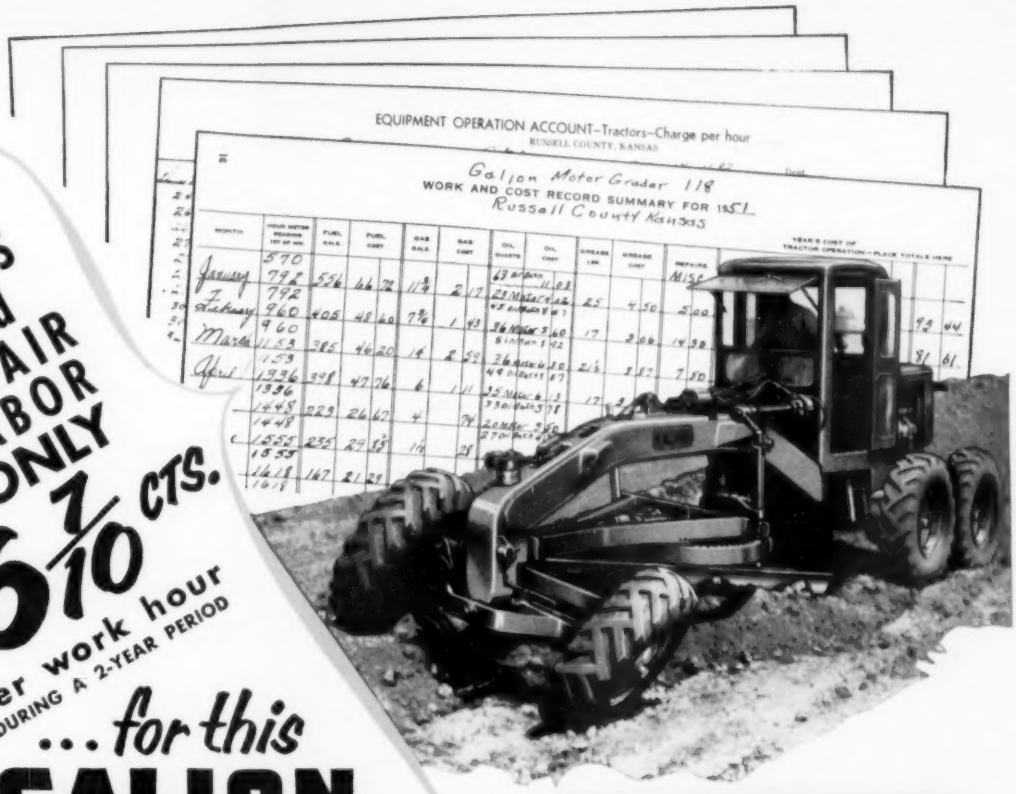
★ **At BARBER-GREENE COMPANY,** Aurora, Ill., H. A. Barber succeeds W. B. Greene as president. New vice presidents are, E. H. Holt, director of sales, and J. D. Turner, director of publicity and promotion. Barber-Greene are reputed the world's largest makers of black top paving machines.

★ **F. B. PINZEL** becomes sales manager, Buffalo Steel Division, H. K. Porter Co. Inc., at Tonawanda, N.Y.

★ **SIMPLEX VALVE & METER COMPANY,** Philadelphia, appoints George L. Walker district manager, at 330 West 42nd Street, New York, succeeding W. K. Sowdon Co.

★ **AMERICAN WELL WORKS,** Aurora, Ill., names S. H. McCullough sales representative for the large area surrounding his Memphis headquarters.

★**SIGN** in a Moscow polling place: Vote for Malenkov. The life you save will be your own.


EQUIPMENT OPERATION ACCOUNT–Tractors–Charge per hour
RUSSELL COUNTY, KANSAS
Galion Motor Grader 118
WORK AND COST RECORD SUMMARY FOR 1951
Russell County Kansas

PARTS and REPAIR LABOR ONLY 6 7/10 CTS. Per work hour DURING A 2-YEAR PERIOD

...for this GALION MOTOR GRADER

Maintenance costs are watched carefully in the Russell County Highway Department in Kansas. Quality of equipment design and construction are quickly reflected on the detailed "Work and Cost Record" sheets kept by this county.

They reveal that for 1951 and 1952 the total repair costs *(parts and labor)* for their GALION 118 Grader amounted to only $245.79. Prorated over the 2-year total of 3,679 recorded work hours for this grader, gives the amazingly low repair cost figure of 6-7/10 cents per hour. That's the kind of service record that SAVES MONEY!

Write for literature.

Ask your Galion Dealer to show you the color movie "GALION MAKES THE GRADE"

IF YOU WANT TO CUT COSTS ...BUY A GALION MOTOR GRADER

ESTABLISHED GALION 1907

RETURN THIS COUPON TODAY

THE GALION IRON WORKS & MFG. CO., Dept. P-54, Galion, Ohio, U. S. A.
Please send me literature on the machines and attachments checked.

MOTOR GRADERS	GRADER ATTACHMENTS	ROLLERS
☐ No. 118, 100-104 h.p.	☐ Snow Plows and Wings	☐ Tandem
☐ No. 104, 85 h.p.	☐ Hydraulic Shiftable Moldboard	☐ Three-Wheel
☐ No. 450, 75 h.p.	☐ Creeper Transmission	☐ Portable
☐ No. 303, 55 h.p.	☐ Bulldozer	☐ Trench
☐ No. 503, 40 h.p.	☐ Elevating Loader	☐ Towing Attachment

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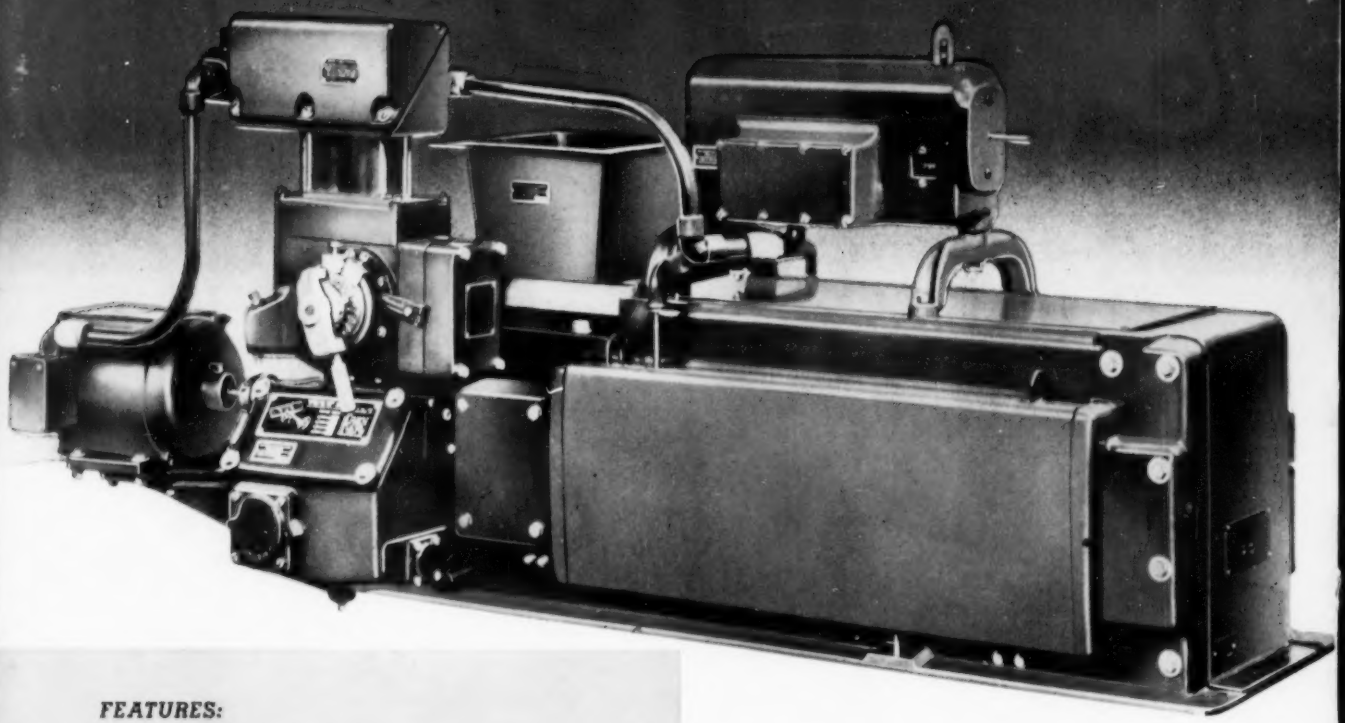
W&T Merchen Feeders give precision feeding of any waterworks chemical... *by weight.*



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—Durable construction, sealed bearings and dust shields.

—Automatic built-in alarm switch.

—Knife edges and pivots tipped with special alloy for long life.

—Remote feed rate adjustment if desired.

—Adaptable to fully automatic proportional control.

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